

The AUTOMOBILE

U. S. Has 1,253,875 Cars

Registration Statistics for 1913 Show an Increase of 243,392 Over 1912 Figures—Production Estimated at 450,000

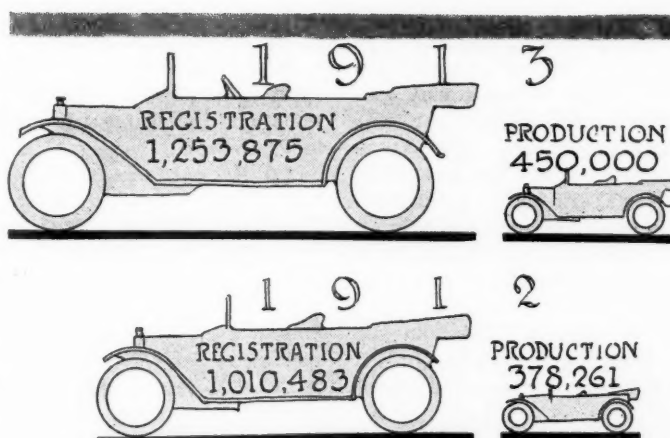
By Donald McLeod Lay

DESPITE the widespread talk of hard times, business depression and tight money which characterized a large part of the year 1913, the automobile business in general seems to have been very little affected. The truth of this statement is readily realized when the statistics of the industry are studied.

According to the most accurate figures obtainable, during this year of hard times the number of automobile and motor trucks registered in the United States increased from 1,010,483 in 1912 to 1,253,875, a gain of 243,392, and the output of the factories grew from 378,261 cars and trucks in 1912 to over 450,000 in the past year.

Registration Developments

There have been some rather surprising developments in the registration statistics since the 1912 census was made of the automobile population of the several states. The misleading effect of figures taken in states where cars are registered but once, except upon transfer of ownership, was exemplified in California. This state was credited with 88,



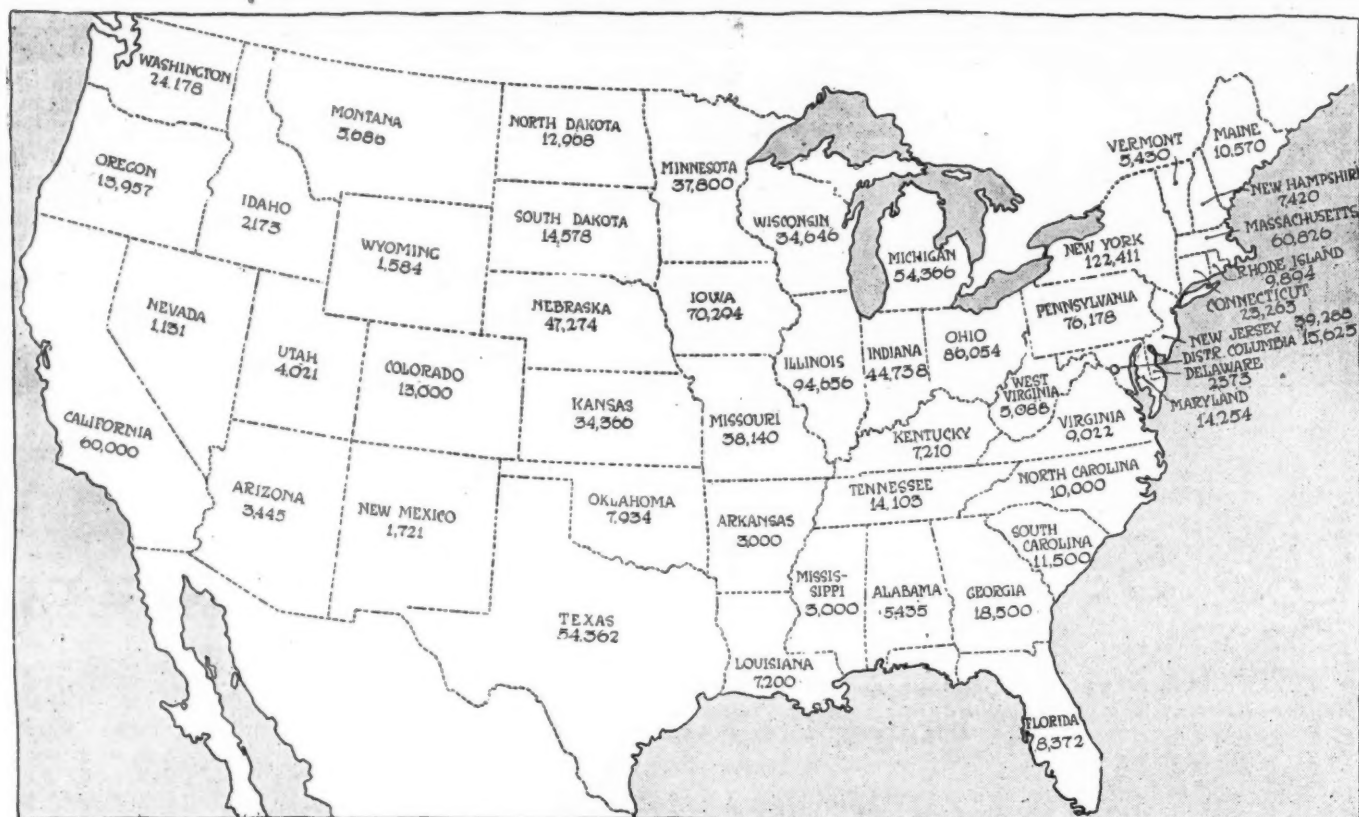
699 cars and trucks in 1912, while, under its new law, there are but 60,000 registered.

Old Figures Too High

In a similar way, the figures for several other states were found to be high. Those for Idaho, which were estimated by local authorities upon the request of THE AUTOMOBILE in default of official registration in 1912 as 2,500, dropped to 2,173. West Virginia showed a decrease of 261, the 1912 count being 5,349, while that for the past year is 5,088. In Wyoming the registration under the new law shows that the local estimators are somewhat too optimistic, as the state has only 1,584 cars and commercial vehicles instead of 3,300. Indiana figures for 1913 are 44,738, nearly 10,000 less than those for 1912, which were 54,000. The discrepancy is probably due to the adoption of different methods of registration under the new law. In contrast to the estimates for Idaho and Wyoming, that for Montana was low as is revealed by the official figures, which show, 5,686 as compared with the local authorities' guess of 2,000 for 1912.

New York.....	122,411	Colorado.....	13,000
Illinois.....	94,656	North Dakota.....	12,968
Ohio.....	86,054	South Carolina.....	11,500
Pennsylvania.....	76,178	Maine.....	10,570
Iowa.....	70,294	North Carolina.....	10,000
Massachusetts.....	60,826	Rhode Island.....	9,894
California.....	60,000	Virginia.....	9,022
Michigan.....	54,366	Florida.....	8,372
Texas.....	54,362	Oklahoma.....	7,934
Nebraska.....	47,274	New Hampshire.....	7,420
Indiana.....	44,738	Kentucky.....	7,210
New Jersey.....	39,288	Louisiana.....	7,200
Missouri.....	38,140	Montana.....	5,686
Minnesota.....	37,800	Alabama.....	5,435
Wisconsin.....	34,646	Vermont.....	5,430
Kansas.....	34,366	West Virginia.....	5,088
Washington.....	24,178	Utah.....	4,021
Connecticut.....	23,263	Arizona.....	3,445
Georgia.....	18,500	Mississippi.....	3,000
Dist. of Columbia.....	15,625	Arkansas.....	3,000
South Dakota.....	14,578	Delaware.....	2,373
Maryland.....	14,254	Idaho.....	2,173
Tennessee.....	14,103	New Mexico.....	1,721
Oregon.....	13,957	Wyoming.....	1,584
Nevada.....	1,131		

Registration and production of 1912 and 1913 compared. The tabulation represents registration in each state, allowing for all duplication



Map showing actual registration of automobiles in 1913 in the various states, excluding duplicate registrations

Some striking increases in registration during the past year are to be noted, as will be seen by referring to the comparative columns of the table on page 631. It may surprise some people to learn that the biggest gain of the year goes to the credit of the Empire State, which, according to the report of the secretary of state, added 27,119 vehicles to its rolls during that period. New York has also managed to hold her supremacy among the states in point of number of cars registered with 122,411, allowing for all duplicate registration due to non-residents and transfers of ownerships.

California drops from the proud place of second in the list, which she held for several years by reason of the inflated registration figures, to seventh, but she is still well to the front with 60,000 cars and trucks.

Illinois has leaped into the position left vacant by California with the creditable total of 94,656, a gain of 26,643, while Ohio keeps up her consistent progression toward the 100,000 mark, having attained 86,054 in 1913, a step of 24,027 beyond 1912.

Pennsylvania has made a creditable showing in the registration sweepstakes in which the states are engaged in respect to automobile registration, having 20,821 new registrations, and increasing her total from 59,357 for the year 1912 to 80,178.

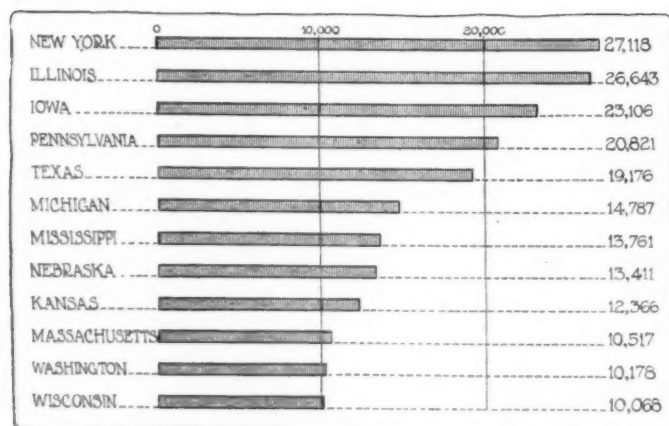
But the most sensational gain of all might be said to be that made by Iowa. During 1913 the farmers of that state were reported to be buying cars in large quantities, but few, even of the most sanguine, imagined that there would be a 50 per cent. increase in the registration during that year. Iowa, although her registration for 1912 was only 47,188, showed a gain of proportions nearly equal to that shown by such states as Ohio and Pennsylvania, having added 23,106 to the 1912 total, bringing the 1913 figures to 70,294.

Another figure which is of particular interest is that representing the standing of Texas as an automobile-buying state. During 1913 the Lone Star State invested in 19,176 machines which brought the 1912 census figures of 35,187 up to 54,363.

Besides the states mentioned, seven others showed increases of over 10,000 machines in 1913. These are: Kansas, with a gain of 12,366; Massachusetts, with 10,517; Michigan, with 14,787; Missouri, with 17,361; Nebraska, with 13,411; Washington, with 10,178; Wisconsin, with 10,066. Gains in the remaining states averaged about 4,000 apiece, varying from 87 in South Dakota to 8,800 in Minnesota. In considering the figures for Minnesota it must be remembered that registration is triennial.

Great progress has been made during the past year in the adoption of automobile laws by states which up to the end of 1912 had either unsatisfactory measures or none at all in force. Under the new California law registrations may be kept track of much more accurately than under the old conditions. The same may be said of Nevada, Kansas and Ohio. Indiana also has a new law, aimed to be an improvement over the former one. States which had no automobile law in 1912 but which now have such measures are: Colorado, Idaho, Montana and Wyoming.

There are now two states and the District of Columbia



Twelve states showed increases of over 10,000, that having the greatest being New York, with 27,118

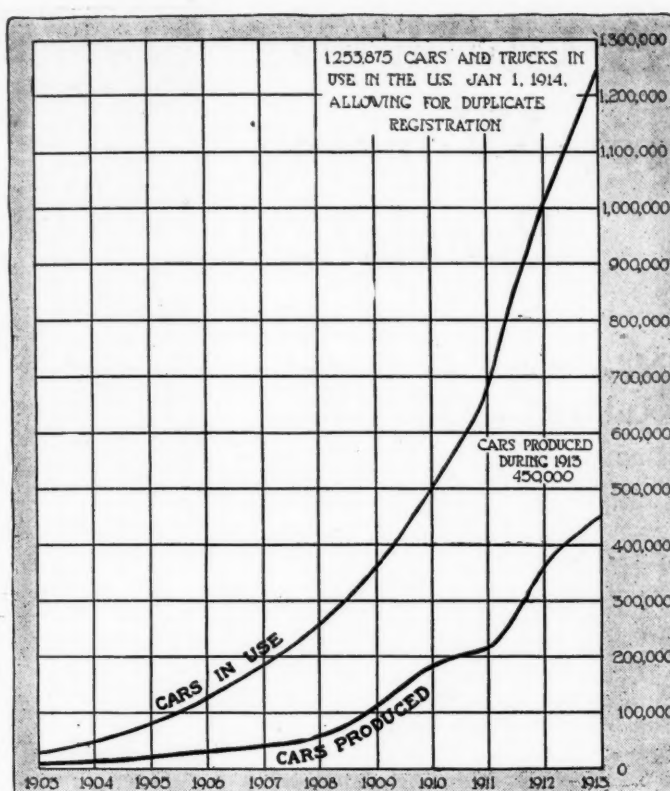
which have perennial registration, that is, when a car is registered once it need not be registered again until it changes owners. It is very probable that new measures providing annual registration will replace these before very long. This may also be true of the triennial registration characteristic of Minnesota.

It is greatly to be regretted that all the registration officials do not segregate the various types of vehicles, the non-residents and transfers of ownership as is done by the officials of the New England states, New York and a few others, as may be seen by referring to the accompanying table. This shows that the detail figures of registration are very incomplete in most of the states, not even the number of chauffeurs being available.

Big Production in 1913

In order to secure the most accurate figures possible regarding the production of cars and trucks for 1913, THE AUTOMOBILE sent letters to 398 of the companies manufacturing at the present time. Many of them refused to give the information as being too private, but from the letters received the total production for the year was close to 450,000, the number of trucks running about 40,000. With regard to predictions of their output for 1914 practically all of the companies were ready to give figures which totalled 644,708. This is very high, it seems, and THE AUTOMOBILE would estimate the figure as likely to be nearer 500,000, possibly 525,000. The following gives an interesting table:

	1911.	1912.	1913.
Registration	677,000	1,010,488	1,253,875
Output Cars	200,799	349,609	410,000
Output Trucks	9,158	28,852	40,000



Curve showing car registration and production from 1903

Automobile Registration in Each State in the Union Up to January 1, 1914, with Duplicate Registrations

State or Territory	Total Registration	New Registration	Registration up to 1913	Gasoline Passenger Cars in Use	Gasoline Commercial Cars in Use	Electric Passenger Cars in Use	Electric Commercial Cars in Use	Non-Resident Registration*	Re-Registered**	Chauffeurs Registered	Remarks
Alabama.....	5,500	1,100	4,400	5,000	200	300	None	15	50	650	
Arizona.....	3,583	1,959	1,624	3,408	165	10	None	138	***	703	
Arkansas.....	3,000	750	2,250	***	***	***	***	***	***	***	
California††	60,000	***	88,699	***	***	***	***	***	***	10,000	New law
Colorado.....	13,000	4,050	8,950	***	***	***	***	***	***	2,000	New law
Connecticut.....	23,263	5,313	17,950	20,000	2,059	351	141	***	***	2,727	
Delaware.....	2,373	641	1,732	***	***	***	***	***	***	***	
Dist. of Col.†††	16,625	3,936	12,689	14,644	547	646	89	1,000	***	***	Perennial registration
Florida.....	9,372	2,623	6,749	9,000	***	***	***	1,000	***	***	Perennial registration
Georgia.....	22,000	2,860	19,140	***	***	***	***	3,500	***	***	
Idaho.....	2,173	***	12,500	2,136	32	***	***	***	***	***	New law
Illinois.....	94,656	26,643	68,013	***	***	***	***	***	***	12,340	
Indiana††	44,738	***	54,000	***	***	***	***	***	***	2,961	New law
Iowa.....	70,294	23,106	47,188	***	***	***	***	***	***	***	
Kansas.....	34,366	12,366	22,000	***	***	***	***	***	***	***	New law
Kentucky.....	7,210	2,063	5,147	***	***	***	***	***	***	***	
Louisiana†	7,200	200	7,000	***	***	***	***	***	***	***	Local registration
Maine.....	10,570	2,827	7,743	10,193	365	351	141	***	***	***	
Maryland.....	14,254	3,767	10,487	12,997	1,257	***	***	***	***	***	
Massachusetts.....	61,746	10,517	51,229	56,703	5,539	604	409	920	***	***	
Michigan.....	54,366	14,787	39,579	***	***	***	***	***	***	4,837	
Minnesota.....	37,800	8,800	29,000	***	***	***	***	***	***	***	Triennial registration
Mississippi.....	3,000	105	2,895	***	***	***	***	***	***	***	State law declared void
Missouri.....	38,140	13,761	24,379	***	***	***	***	***	***	***	
Montana.....	5,686	3,686	12,000	***	***	***	***	***	***	***	New law
Nebraska.....	47,274	13,411	33,861	***	***	***	***	***	***	***	
Nevada.....	1,131	231	900	1,090	38	3	None	***	***	***	New law
New Hampshire.....	7,436	1,672	5,764	6,770	40	35	17	16	***	***	222 steam passenger, 7 steam trucks
New Jersey.....	51,360	8,304	43,056	49,588	1,772	***	***	9,000	3,072	***	
New Mexico.....	1,721	810	911	***	***	***	***	***	***	***	
New York.....	132,664	27,118	105,546	114,364	9,000	6,700	2,600	2,168	8,085	56,702	
North Carolina.....	10,000	3,822	6,178	***	***	***	***	***	***	***	
North Dakota.....	13,075	4,075	9,000	13,059	10	6	None	4	103	***	
Ohio.....	86,156	24,027	63,129	78,356	4,000	3,500	300	73	29	***	New law
Oklahoma.....	7,934	1,410	6,524	7,474	250	200	10	***	***	***	
Oregon.....	13,957	3,791	10,166	***	***	***	***	***	***	***	
Pennsylvania.....	80,178	20,821	59,357	***	***	***	***	***	4,000	29,447	
Rhode Island.....	10,182	2,617	7,565	9,057	1,071	34	20	288	***	***	
South Carolina†	11,500	1,500	10,000	***	***	***	***	***	***	***	Local registration
South Dakota.....	14,578	87	14,491	14,553	15	10	None	***	***	***	
Tennessee.....	14,103	4,130	9,973	***	***	***	***	***	***	***	
Texas.....	54,363	19,176	35,187	***	***	***	***	***	***	***	
Utah.....	4,021	1,445	2,576	***	***	***	***	***	***	***	Perennial registration
Vermont.....	5,918	1,735	4,183	5,763	146	7	2	448	***	***	
Virginia.....	9,022	3,262	5,760	***	***	***	***	***	***	1,176	
Washington.....	24,178	10,178	14,000	***	***	***	***	***	***	***	
West Virginia.....	5,088	***	5,349	***	***	***	***	***	***	***	
Wisconsin.....	34,646	10,068	24,578	***	***	***	***	***	***	***	
Wyoming.....	1,584	***	13,300	***	***	***	***	***	***	***	New law
	1,287,784	328,821	1,017,687	434,155	26,506	12,757	3,729	18,570	15,339	123,543	

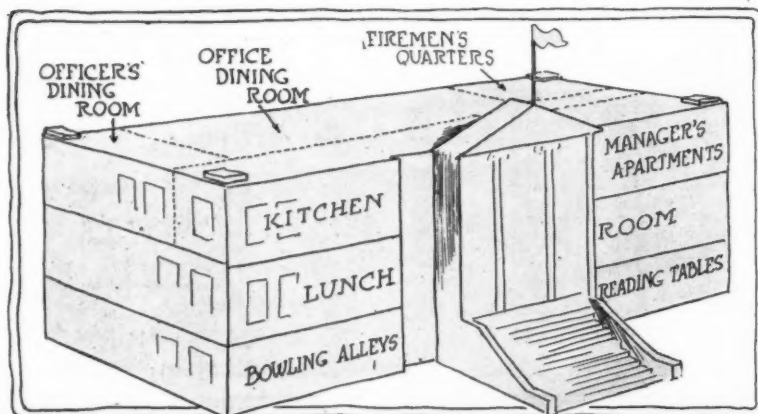
NOTE—3,000 steam passenger cars and 250 steam trucks are included among the gasoline machines. Dots indicate that previous figures are doubtful, discrepancies indicating that the registration officials have made an error in reporting. *The number of cars registered belonging to residents of another state. ** Number of cars re-registered owing to changes of ownership, etc. ***Not listed separately by registration officials. †Estimated on basis of population with reference to location and sectional registration. ††New law makes registration figures low. †††Figures are high as many re-registrations are included.

A Clubhouse for Working People

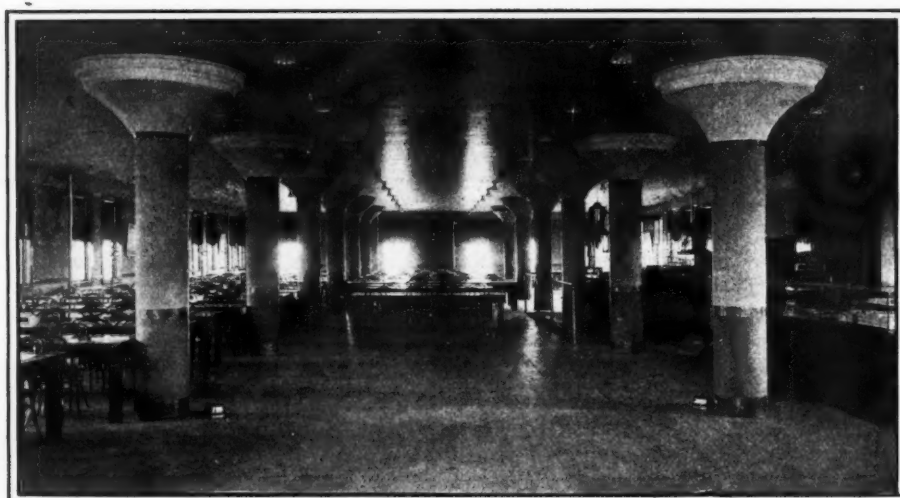
New Club of Republic Rubber Co. Offers Many Facilities to the Employees

THAT a clubhouse intended for the working people in a factory can be operated successfully has been demonstrated during the last 6 weeks by the Republic Rubber Co., Youngstown, O., whose clubhouse for its employees was opened on January 15. This clubhouse, as previously stated in these columns, is located across the street from the factory, and is a \$60,000 fireproof, concrete and brick three-story structure, built by the directors of the Republic company for their employees on a 27-acre lot of rolling land. It is not a clubhouse for the heads of departments or for superintendents but for the men and women who work at the machines and in the offices throughout the plant, and while the clubhouse and grounds are the property of the Republic Rubber Co. they are placed at the disposal and for the use of everyone connected with the company.

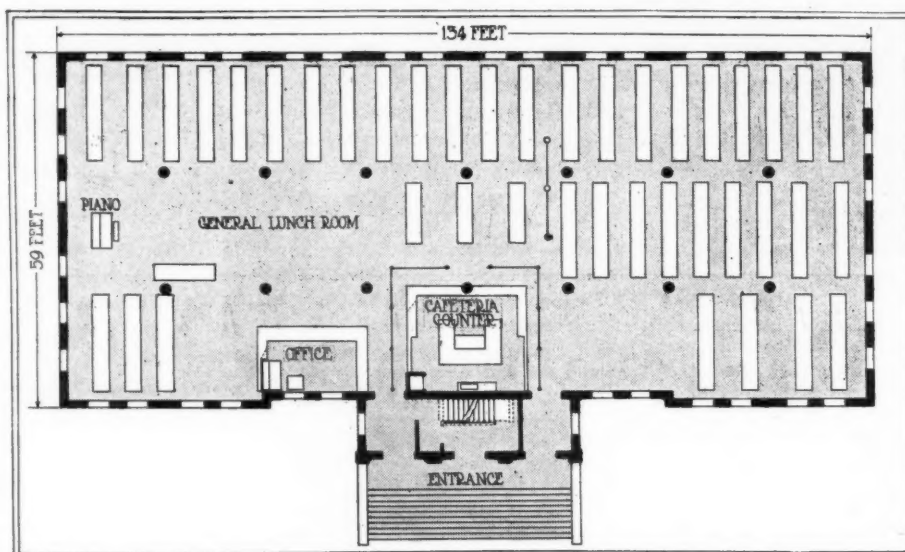
At first the doubting Thomases said that the working men and working women would not use such a club, and that it would be a failure. This doubt is exploded by the fact that the club in its 6 weeks' history has 676 sustaining members who have paid \$1 per year membership for all club privileges; in addition to this, everyone of the company's employees has the privilege of lunching in the club.



Perspective outline of the new Republic Rubber Co.'s clubhouse, showing the location of the various departments



Main floor, dining room, with cafeteria counter and tables for the workmen and workwomen. A cigar and candy stand is also on this floor



Plan view of the main dining hall on the first floor, showing position of various features as well as the direct entrance

Before the end of the first month, 300 of the working men and women were taking lunches and other meals at the clubhouse each day, and 300 others bringing their own lunches were using one of the dining rooms for eating these lunches, and buying a hot cup of coffee or a bottle of milk in addition at a price which would put the rates of the average lunch counter to shame.

Other parts of the club have, in its short history, been patronized as well if not better than the dining rooms. The basement is entirely given over to recreation with its six bowling alleys, its pool tables, its reading rooms, its recreation rooms, its gymnasium equipment, and its shower baths, all of which are privileges enjoyed for the fee of \$1 per annum. The club is open until 11 o'clock each evening and all of the recreation departments are patronized to the full. There is a waiting list in the bowling alleys and generally the seating gallery back of the alleys is well filled with men and women. One has but to spend 10 minutes in this great recreation room to discover the work that the club is doing in building up a spirit of co-operation and comradeship, not only among the working forces but among the working forces and the department heads, superintendents, clerical departments, etc.

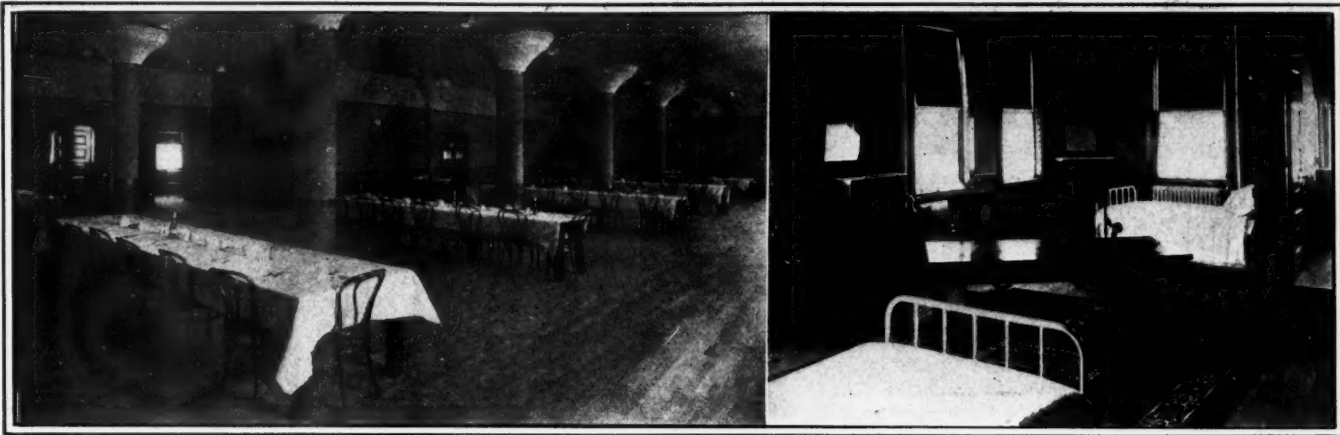
In this room, the *esprit de corps* of the factory is being developed daily. The working forces are learning that there is more in life than spending hours by the machine and other hours in places of more questionable value. A new side of the toiler's existence is being daily unfolded and the results will be sure to show themselves throughout the entire atmosphere of the factory before a year has passed.

At this early date it is not known exactly how the finances of the club will work out, but with the patronage the dining rooms and all of the recreation departments are already receiving it is certain that a feasible plan of operation will soon be developed.

Under the constitution of the club the management is controlled by a board of governors, three of whom are appointed by the president of the Republic Rubber Co., and the other five elected by vote of the employees. The president of the

Republic Rubber Co. is ex-officio a member of the board. This board of governors has general control of the operation and management of the clubhouse, and may establish rules for the regulation of it, and decides for what purposes the club may be used. This board has the power to vote upon and recommend to the Republic Rubber Co. changes, alterations, or improvements affecting the property of the clubhouse and the surrounding grounds, these recommendations calling for the expenditure of money, or otherwise, and, while the regulation of the club is under its board of governors, the action of this board may be revised and shall be subject to the control of the Board of Directors of the Republic Rubber Co.

The board of governors of the club has its regular list of standing committees which look after the various activities of the members, each committee consisting of three members and the action of all committees subject to the



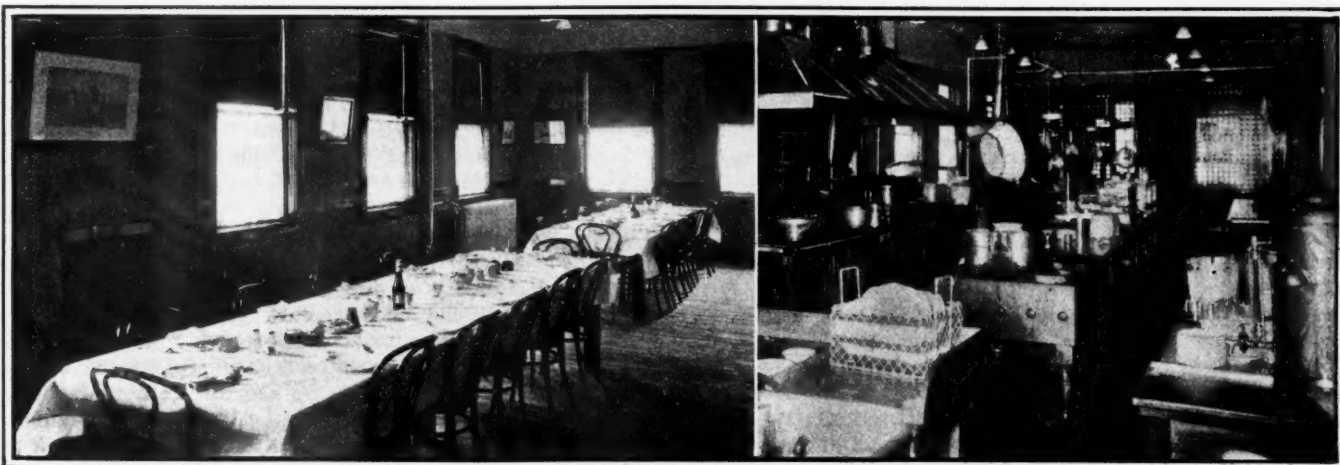
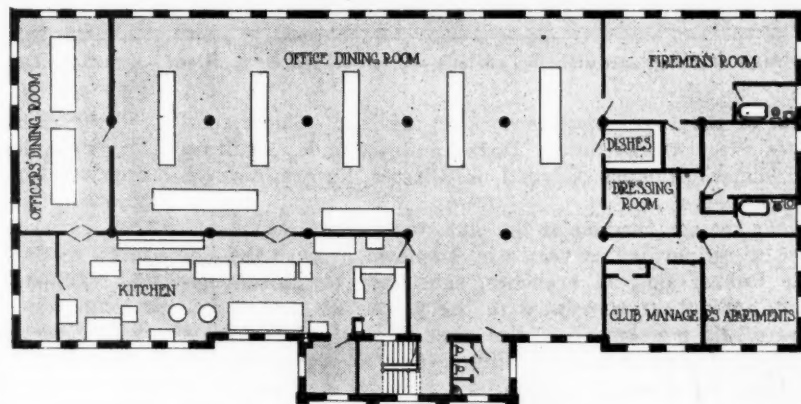
Upper left—Office dining room on the top floor for club members who pay \$1 a year dues

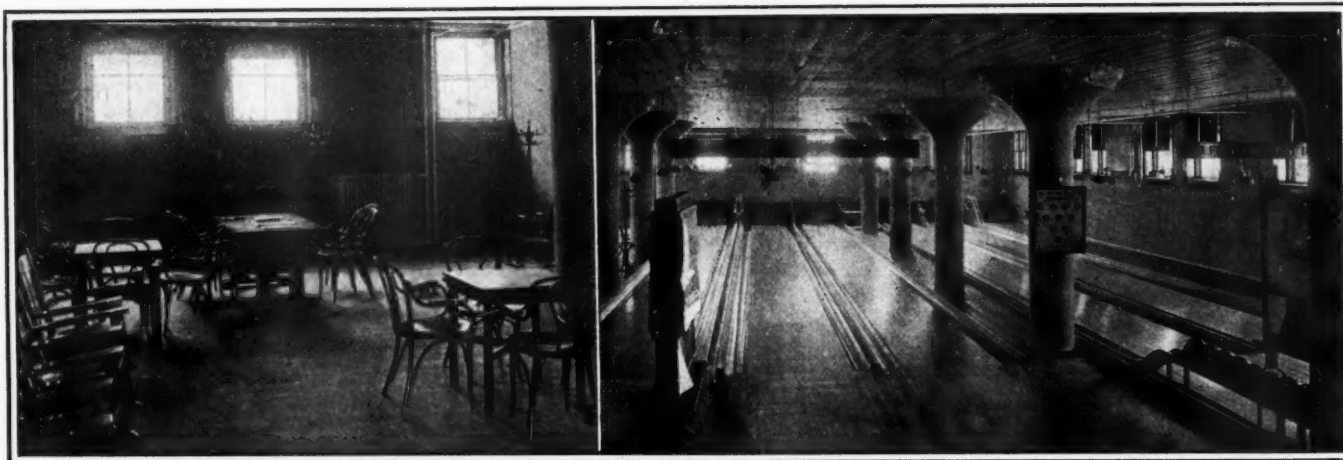
Upper right—Firemen's room on the same floor, fitted with fire alarms and bathroom

Right—Plan of top floor, showing position of firemen's quarters, club manager's apartments and the dining room

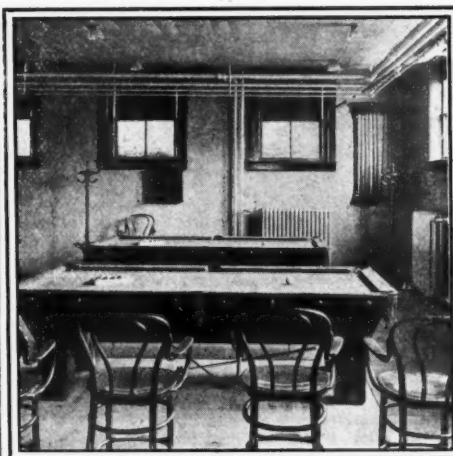
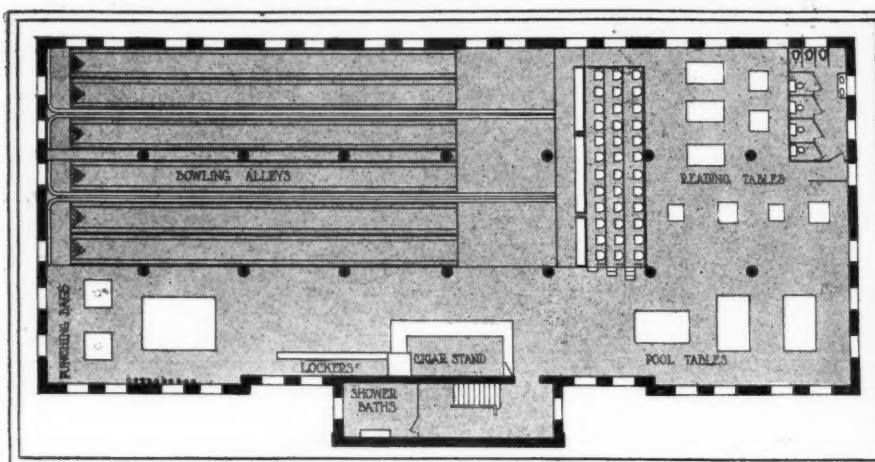
Lower left—Officers' dining room at one end of the top floor, for officers, guests, etc.

Lower right—The up-to-date kitchen on the top floor





Left—Reading tables in basement. Right—The six bowling alleys. Gymnasium equipment is also a feature



Left—Plan of basement, showing various recreation features. Right—A corner of the recreation room in the basement, with pool tables

control of the board of governors of the club. These committees are: Organization, House and Grounds, Auditing and Finance, Athletics, Educational Classes, Entertainments, and Grievances.

Under the constitution of the club, the membership is extended to all persons connected by employment with the Republic Rubber Co., its branches, subsidiary or allied companies, and others associated in the production and distribution of its merchandise. The club officers are the same as those of any regularly organized club, consisting of president, vice-president, secretary, treasurer and executive committee.

The treasurer has charge of all funds of the club received from annual dues, or entertainments given by its members, and disburses the same under the direction of the board of governors. He reports on the finances at the regular meetings, keeps a regular set of accounting books, and his annual statement will be required to be handled the same as in any organization.

The dining room facilities have been made the major feature of the club and two floors are devoted to this. The main floor is given over as a general lunch room, and has a cafeteria counter in the center at one side. Practically the entire room is occupied with long tables at which the men and women eat their luncheons, having obtained same from the cafeteria counter or brought them from their homes.

On the top floor is the office dining room, that is, for those who have paid \$1 per year club membership dues. In this dining room, table linen, and all other club necessities are provided. In one end of this floor is the officers' dining room, giving accommodation for twenty-four at two tables. Also located on this floor is the kitchen, the living apartments

for the club manager, and a corner room with three beds for the volunteer fire department of the factory. These firemen's quarters are particularly well fitted up with an adjoining bath, and have in addition to the fire alarm system, a ticker which records the location of the fire in the factory.

Breakfasts are served à la carte from 5:30 to 8 each morning.

The regular luncheon, consisting of soup, meat, vegetables, bread, butter, tea, milk, coffee and dessert, is served from 11 a. m. until 1 p. m., on the main floor and top floor.

The recreation departments have been made attractive to the working men and working women not only by the reduced prices at which the privileges can be enjoyed as compared with prices in the city, but by the atmosphere which surrounds the entire club. As the spring opens it is intended to build tennis courts for the members on the property surrounding the clubhouse; a baseball field will be put in, and other forms of outdoor athletics developed.

Since the inception of the club, the members have been quick to take advantage of the facilities it offers for evening recreation. Dances have been held in which the officers, working men and women, superintendents and department heads have all participated without the slightest symptom of undue familiarity or discourtesy that might be expected under such conditions. A movement has already been started for educational classes to be conducted in the evenings on various subjects. This movement has been started by the club membership rather than by the directors or management of the Republic Rubber Co. Complimentary dinners to heads of departments or to members of the company having to locate in other cities are held on the top floor.

Making Automobile Highways Safe

Massachusetts a Pioneer in Movement To Curb the Reckless Driver

By James T. Sullivan

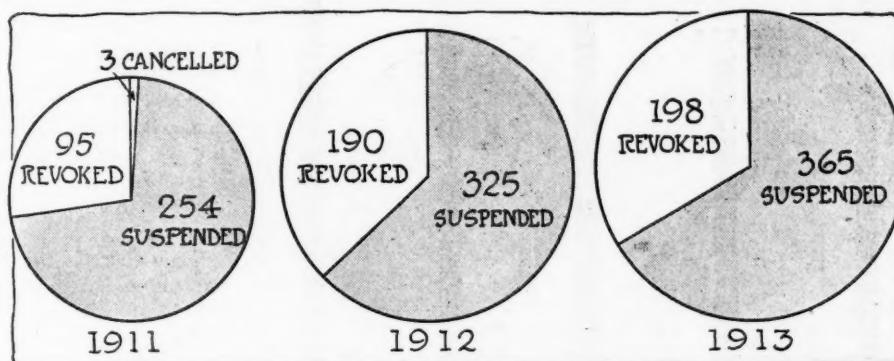


Diagram showing the number of drivers' licenses suspended and revoked in the State of Massachusetts during the years of 1911, 1912 and 1913

BOSTON, MASS., March 10—Massachusetts lays claim—and it is believed justly—to being the pioneer in starting a movement to make the highways safe, following the introduction of many motor cars on the roads. If its claim to priority for the United States is disputed, there can be no question that the Bay State led New England in this respect.

As a result of 6 years' work there are now six organizations whose total membership is 10,000, or 20 per cent. of the Massachusetts total car registration of 1913, all pledged to work for the banishment of the reckless driver from the Bay State highways. These organizations, comprise The Automobile Legal Assn., The Safe Roads Assn., the Massachusetts State A. A., The National Automobile Assn., the Massachusetts Automobile Operators' Assn. and the Highway Safety League. Then there is the Massachusetts Highway Commission, clothed with official power, and which works in co-operation with the officers of the other organizations.

Figures of revocations and suspensions as a result of what may be termed careless or reckless driving show that while automobiles increased 26 per cent. more than last year, yet there was but an 8 per cent. increase in the dropping of licenses, or about one to every 275 cars registered, a very good showing.

History of the Movement

Nearly 6 years ago the first steps were taken in Boston when a number of men prominent in civic and public life, most of whom were motorists, decided that the time had come to check reckless driving. There were then 15,000 cars in Massachusetts, 25 per cent. of the present number. So on June 12, 1907 there was formed the Safe Roads Automobile Assn. of Boston. Col. William D. Sohler, now chairman of the Massachusetts Highway Commission, was elected president. George McC. Sargent was chosen counsel and the work of getting after the reckless drivers was started. Each of the members pledged various sums to pay the cost of prosecution. It was work that really belonged to the state, but at that time Massachusetts was not ready to undertake the work. The Safe Roads Assn. had its members watch for flagrant violations of the automobile law, and through newspaper clippings it watched for accidents. Investigations were made by sending a man to the spot who questioned residents, police officials, and the people who figured in the accidents. Where action warranted it prosecutions were made in court. Much good work was done, and the tendency to recklessness was somewhat checked.

So well did the plan work out that the legislature early in 1908, following a recommendation from the Highway Commission, passed a law that gave the commission authority to employ investigators to work along lines similar to those of the Safe Roads A. A. The law went into effect in July, 1908, and two investigators were appointed. At the same time Colonel Sohler was appointed a member of the Highway Commission.

The law was also strengthened requiring that courts send in records of convictions.

The Safe Roads Association continued its work of investigating. It is still in existence, and while it brings cases to the attention of the Highway Commission now, its activity of the first year has diminished. In its first year under the new law the Highway Commission investigators delved into fifty-nine accidents and complaints. The commission suspended fifty-one licenses and revoked forty-four others, a total of ninety-six. Each year with the growth of motoring the commission has had to give more time to accidents and breaking of the motor laws. So it sets aside a day in the week, usually Wednesdays, for giving hearings to motorists. Figures for the past 3 years show that the hearings jumped from 240 in 1911 to 289 in 1912 and to 308 last year. In 1911 359 licenses were suspended and revoked. Then the commission took a spurt and in 1912 the figures jumped up to 515.

Improvement Last Year

There is no doubt that a check was put to recklessness when last year the totals reached 563. That is but 48 more than in 1912, yet the registrations show that there was an increase of 12,528 motor cars in 1913. If a deduction of 10 per cent. is made for re-registrations, it shows that even with more than 10,000 additional cars it was necessary to suspend and revoke only forty-eight more licenses. And there were only 308 hearings, or nineteen more than the previous year.

The figures of the commission show that there has been an increase in the number of accidents. The increase is to be expected from the larger number of cars as a natural sequence. But the figures of the past 3 years, particularly of 1913 over 1912 are explained easily. In 1913 a new law made it mandatory for every motorist who figured in an accident to make a report to the commission. Failure to do so costs a driver his license. So the commission then began to get all sorts of reports. One man ran over a straw hat, and he had to report it, for property was injured. Another bumped a cow, or was bumped by the cow, but it figured as an accident. Hundreds of these trivial accidents have been reported and put with the totals so that there is no way to get at the really serious accidents. No wonder the figures show a big jump.

Tried to Change Speed Law

The Highway Commission last year tried to get a law passed that would make the speed law of Massachusetts a flat rate of 25 miles an hour. The members of the commission argued that 25 miles was fast enough, and that judges or policemen would not call 28 miles too fast if the law said 25. But the motorists defeated this bill, as they had too much personal touch with the judges of Massachusetts to let them use their discretion. This year the commission has again recommended a similar bill and it will be fought again. In some instances the commission es-

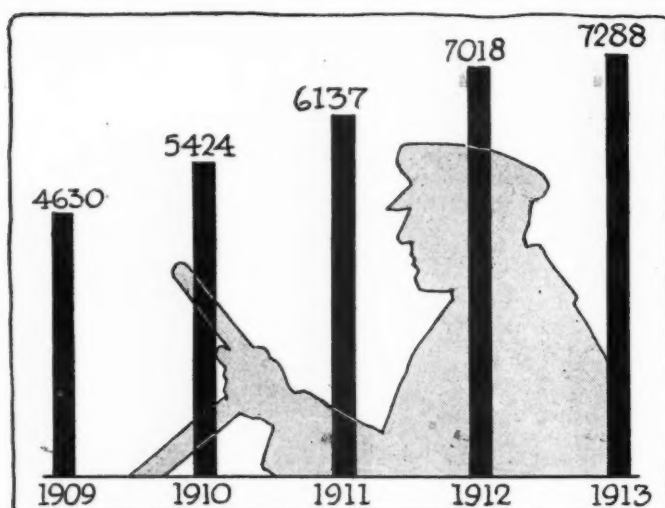


Chart showing the number of licenses issued to chauffeurs in the State of Massachusetts each year from 1909 to 1914

established a probation period and placed drivers on record, getting them to sign an agreement not to drive faster than 25 miles an hour, the consequences being a revocation of a license if arrested and convicted. This has worked well as those on probation have kept its conditions.

The commission grants a hearing whenever a motorist demands one. At the hearing the driver may be represented by counsel. Then the case is threshed out with the commission sitting as a court. In other instances the commission summons a motorist before it for trial. The law gives the commission power to summon witnesses and pay fees just like the superior court. There is no chance to dodge the issue. The motorist is put on oath, and if he testifies falsely he may be charged with perjury. Moreover, there is no appeal from a decision of the commission. Some motorists have agitated an appeal to the courts for a review of a decision but it has never been broached in the legislature.

Next in importance as a factor in checking reckless driving comes The Automobile Legal Assn. of Massachusetts. It is now 5 years old, has a membership totaling about 5,000, and it is the strongest motor body of its kind in the country. It has reported many instances of reckless driving that its members saw, and these cases have been gone over and some of them reported to the Highway Commission for action. But last year it did more to check recklessness than had ever been done in this country. It policed hundreds of miles of state highways in the New England states with a corps of men on motorcycles. There were from nine to fourteen on the roads all the time for 4 months, and while they were primarily there to aid motorists who needed attention of any kind from pumping tires to making repairs or getting right directions, they found plenty of occasions to chase and warn drivers who were not acting right.

Effect of the Motorcycle Squad

The news that this motorcycle squad was on the road soon spread, and it resulted on a perceptible slowing down on some of the stretches where drivers formerly broke the speed law. W. A. Thibodeau, general counsel of the association, sent out scores of letters warning motorists to use more caution, and giving data as to when cars were being operated improperly. There was no guesswork to it, for time, place and conditions were filled out by the motorcycle men. Where conditions warranted it Mr. Thibodeau prosecuted the offenders before the Highway Commission. The commission worked in harmony with the A. L. A. as it realized the important work it was doing on roads where it would be impossible to police the roads. The work cost the A. L. A. about \$4,000, or about \$1,000 a month, for the four summer months the squad was on the

highways. This year a larger squad will be put out and the area to be covered will be greater.

As there were 30,000 motor vehicles from other states in Massachusetts last summer, and with the 100,000 or so New England motorists traveling about the Bay State or its borders, a total of about one-tenth of all the automobiles registered in the United States, the value of some force to put a check on reckless and speedy driving may be recognized. There was some agitation for a state police force on motorcycles, and a bill was introduced into the legislature last year for one, but it was defeated. So the A. L. A. is shouldering the work at no expense to the state. It will spend at least \$5,000 this year on this work.

Then there is the National Automobile Assn. This is an organization based along the same lines of the A. L. A. but its membership is not so large. Francis Huturbis, Jr., is its counsel, and he is a firm believer in wiping the reckless driver off the road. His members report to him any cases they note and these are called to the attention of the Highway Commission. When formal complaint is made Mr. Huturbis acts as prosecutor.

A year ago there was organized in Boston the Highway Safety League. L. G. Brooks has handled the legal end of it. The members pledged various sums and an appeal was made to the public to forward checks to prosecute the drivers of motor cars that did not live up to the law. The new organization has not a very large membership. It put some bills before the legislature last year, and succeeded in getting through the one that calls for the report of every accident. That bill seemed all right on its face but it is somewhat of a joke in a way.

State A. A. Is a Factor

The Massachusetts State A. A. comprising the A. A. A. body, is another factor in the fight to rid the roads of undesirables. The members of the different motor clubs have been asked to report instances of bad driving, and cards have been sent to a number of men warning them of their actions. These cards stated that a record was kept and another report of reckless driving would be followed by a complaint to the Highway Commission. The state A. A. has also worked to get some legislation passed that would check the reckless man. This year the organization will present more bills along this line.

Another strong body is the Massachusetts Automobile Operators' Assn., with headquarters in Boston. It has a membership of more than 500, some of whom live in different cities of the state. Since its organization more than 3 years ago, one of its objects has been to check the speeder. The members all drive private cars. As a result they are out all hours of the day and night and they can note instances of bad driving.

Law Compelling Reports of Accidents

Two years ago the association went on record by passing a bylaw requesting every member to notify the secretary of any violation of the speed law that seemed unwarranted. It did not exempt members of the organization. The secretary writes

WHAT THE MASSACHUSETTS HIGHWAY COMMISSION HAS DONE IN 3 YEARS TO CHECK RECKLESS DRIVING

Suspensions and Revocations	1911	1912	1913
Licenses revoked.....	95	190	198
Licenses suspended.....	254	325	365
Licenses cancelled.....	3	..	..
Registration certificates suspended or revoked..	2	6	2
Dealer's registration certificate suspended.....	1	..	5
Motorcycle registration certificates revoked.....	5	14	19
Motorcycle certificates suspended.....	..	11	17
Hearings by the Commission.....	1911	1912	1913
Accident increase percentage.....	240	289	308
Automobile increase percentage.....	1911	1912	1913
Total number of accidents.....	29½	59	*105
Accidents, daytime.....	20	29½	26
Accidents at night.....	1,531	2,441	*5,027
On country roads.....	1,098	1,632	3,799
In city or town streets.....	433	809	1,228
	280	495	1,996
	1,251	1,946	3,031

*New law in 1913 required motorists to report every accident no matter how trivial.

to the owner of the car and requests him to be more careful in the future. These letters are kept on file. If it is a member who is reported or if one is arrested for recklessness he is given a hearing, and if the facts warrant it he is expelled from the organization.

The members have pledged themselves to prevent an owner compelling a driver to drive faster than caution allows, and if a member loses his position for such a refusal no other member is allowed to take his place. Moreover, the car is noted and if it is seen being driven faster than necessary the facts are laid before the Highway Commission, for Colonel Sohler, its chairman, told the members he would back up any effort the members made to prevent an owner from having a driver break the law, and blame the chauffeur, the highway commissioner stating he would go so far as to revoke the registration of the car if necessary, even if the owner were a relative of his.

All Chauffeurs are Examined

Another important factor in safeguarding the highways is the fact that Massachusetts insists that all chauffeurs must pass an examination before they are allowed to drive cars. These examiners are not lenient either. The chauffeur must not only pass a written examination showing that he has a knowledge of motor construction, and the rules of the road together with

the motor law, but he must drive a car through the crowded city streets to the satisfaction of the examiner. Many drivers fail in their first test, some in their second, and a few in their third trial. When this happens they cannot take another examination within 6 months. The importance of this work is shown by the total examinations yearly. Here are the figures for the last five years since the law went into effect requiring examinations:

1909	4,630	1913	7,288
1910	5,424		
1911	6,137	Total	30,497
1912	7,018		

And the examinations now given to all applicants for chauffeur licenses gives the drivers some idea of the power of the commission, and what they must do to live up to the law when they read some of the questions on the application blanks. While the millennium has not been reached the Bay State is doing a lot of work to break up speeding and recklessness. Were it not for these organizations busying themselves the motor cars would be either driving all other traffic off the road, or they would be legislated off the road themselves. And the reflection of what Massachusetts is doing is felt in the other New England states.

Bucket Elevator Saves 6 Cents Per Ton in Loading Truck

OFTEN motor trucks used in hauling sand, coal or gravel have to be loaded from the ground. The high cost of performing this operation has done much to retard the sales of trucks for this work. The vehicle has to be loaded by hand and must necessarily stand idle while the work is being done. This is not efficient.

To correct this, the truck loader, below, is made by the Link-Belt Co., Philadelphia and Chicago. A bucket elevator is mounted on large wheels, and, with power supplied by a motor or gasoline engine, loads loose sand, gravel or coal at the rate of a ton a minute. The truck driver trims the truck with a shovel, and one, two or three men, depending on the nature of the material to be handled, trim and feed to the loader. This combination will load the truck at a cost of 2 1-2 cents to 5 cents per ton, the higher cost being that of handling crushed stone, with coal at the low end, and sand and gravel following in order. The saving of about 6 cents per ton thus effected is a large item in these days of close margins and competition.

There is also a growing demand for a further combination of truck and loader, namely: a truck with loader elevator mounted on the rear end of the body, arranged to lower into a storage pile when the truck is backed up to it, and also to raise clear of the ground when not in use. The elevator is supported independently of the dumping body, and is driven, through a clutch, by a connection the truck transmission.

Denver Club Has New System of Keeping Track of Road Conditions

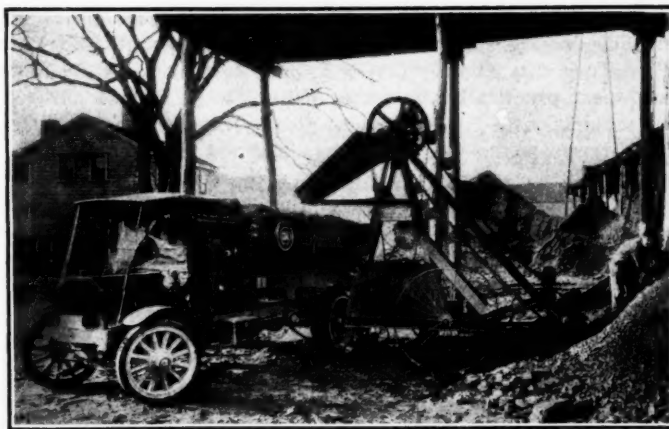
A novel and valuable system of gathering information daily concerning weather and road conditions over an extensive territory and furnishing it to motorists contemplating trips is being operated by the Denver Motor Club, Denver, Col. The plan is working out with excellent success, and the club goes so far as to claim one feature of exceptional benefit not found in the road-information arrangements of any other motor club.

This feature is the service furnished by the Mountain States Telephone Co., which gratuitously turns over to the club every day the latest road and weather data reported to the company's main office by representatives throughout Colorado, Wyoming, New Mexico and parts of Utah and other states in this section of

the country. This arrangement makes it possible to learn conditions throughout this wide territory at any time of day or night, and is of great value to tourists and to the motoring public in general.

This telephone service is supplemented by a plan of giving out self-addressed postal cards to motorists starting out on trips, and having these filled out to cover special stretches of road. Automobile dealers and others are also asked to furnish any special information they may happen to get. Thus it is easy to keep reliable and up-to-the-minute information regarding conditions in general, and also regarding particular stretches of road in bad condition, bridges needing repair, etc. All calls for repairing dangerous points due to defective bridges, washouts, etc., are immediately reported to the State Highway Commission and the respective county commissioners and road overseers, who have been co-operating favorably toward improvements of all kinds.

The information concerning the general road conditions is posted daily at the club's headquarters on a blackboard map of Colorado and neighboring states, where a simple code of marking indicates whether a road is good, fair, muddy, poor or impassable.



Truck loader made by the Link-Belt Co. This consists of a bucket elevator mounted on wheels and is said to save 6 cents per ton in loading loose material

Indianapolis Gets Cream of Europe's Gr



Six-cylinder Sunbeam built by the manufacturers especially for the Indianapolis race. To be guided by Jean Chassagne



The Stutz car to be driven by Gil Anderson at Indianapolis

Special to THE AUTOMOBILE

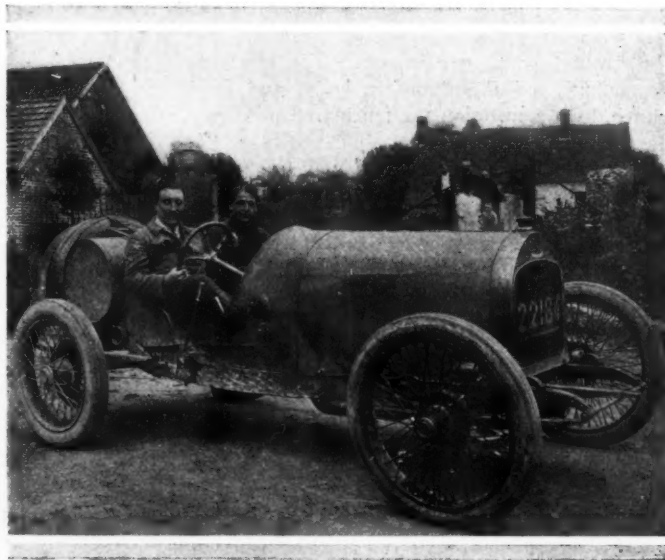
PARIS, March 3—Arthur Duray will take part in the Indianapolis 500-mile race on Memorial Day with the 183 cubic inch Peugeot with which Boillot won first place in last year's *Coupe de l'Auto* event at Boulogne. Duray is a familiar figure to American racing fans, for he took part in several of the Vanderbilt Cup races on Long Island, driving Lorraine-Dietrich cars. Although born in New York City, Arthur Duray is of Belgian nationality and has spent practically the whole of his life in France. He is a race driver by profession and also a certified aviator. His most recent exploit in the automobile world is the driving of the 300 horsepower Fiat racer, with which he attained a speed of 142.9 miles an hour. Before sailing for Indianapolis next May, Duray will again drive this car at Ostend in an attempt to beat all existing records.

The 3-liter Peugeot will undoubtedly be the smallest car in the Indianapolis race, for it has a bore and stroke of only 3.07 by 6.14 inches. It is considered the most efficient racing motor ever built, the power curve showing 92 horsepower at 2,870 revolutions a minute. The car has shown a speed of 95.07 miles an hour for the measured kilometer over an ordinary road, and 93.82 miles an hour average for the kilometer timed in both directions. In the last race in which it competed, its average speed was 63.2 miles an hour for nearly 400 miles. The entire distance was covered with-

out stopping the engine, and with only one stop of the car in order to allow the driver to take a drink. The course over which this race was run is exceptionally hilly, and the average of 63.2 on such a course is equal to 70 miles per hour on medium roads.

Soon after this race at Boulogne the car was purchased by a wealthy French sportsman who has driven it in a few local hill climbs and done a small amount of touring with it. The owner of the car has entrusted it to Duray for the Indianapolis event. Although not having the same maximum speed as some of the other cars, the fact that the Peugeot can cover the full distance without a stop for tires or gasoline will give it a certain advantage, and Duray may be expected to finish well to the front on account of this.

According to the Paris representative of the Indianapolis Motor Speedway, it is believed that the European contingent to visit America next May is now complete. The drivers



Excelsior six-cylinder driven by Joseph Christiaens

Grand Prix Racing Cars and Drivers

Goux's Peugeot, a fine example of the streamline body, which will be brought over for the Decoration Day races

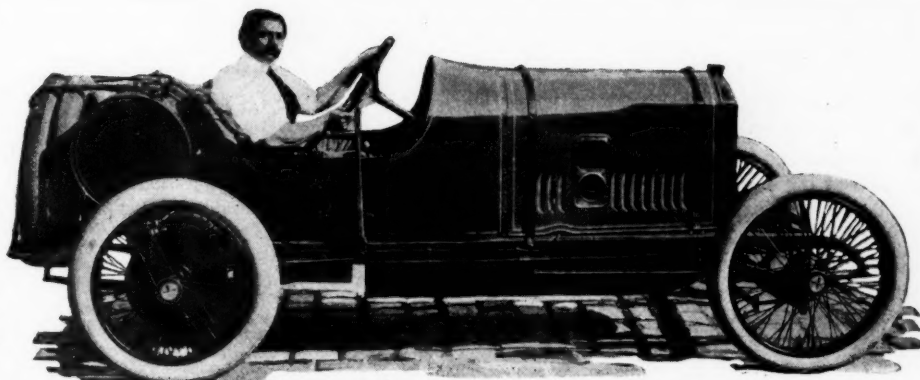


having put in an official entry are:

1. Boillot—Grand Prix Peugeot
2. Goux—Grand Prix Peugeot
3. Albert Guyot—Grand Prix Delage
4. Christiaens—Grand Prix 6-cylinder Excelsior
5. Jean Chassagne—Grand Prix and World's 12-hour record Sunbeam 6 cylinder
6. Arthur Duray—3-liter Peugeot

This team is undoubtedly the strongest ever sent across the Atlantic and promises the finest race ever seen in America. Boillot, Goux, Chassagne and Guyot finished respectively first, second, third and fourth in last year's French Grand Prix. The Peugeot cars have won the Grand Prix 2 years in succession; the Delage holds the world's long distance road record and the Sunbeam is the identical motor which covered 1,078 miles 460 yards in 12 hours, on Brooklands, a world's record.

Joseph Christiaens, chief of the Excelsior racing team, has just handed in his engagement to the European representative of the Indianapolis Motor Speedway for the Memorial Day race on the Indianapolis track. Christiaens will drive the six-cylinder Excelsior car built for the French Grand Prix



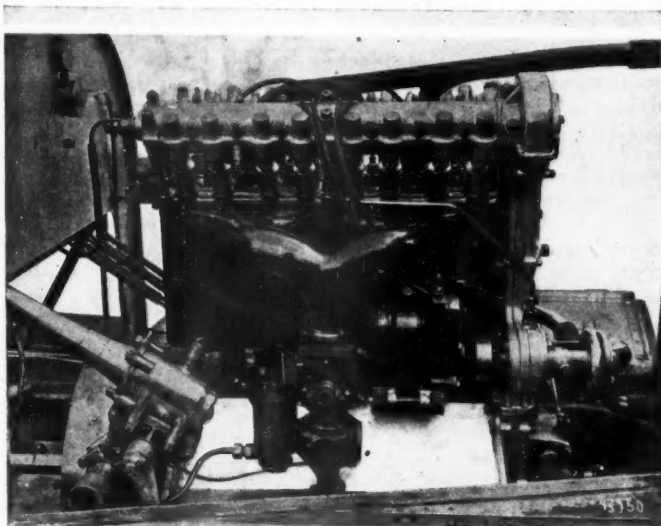
Boillot's Grand Prix Peugeot, which has also been entered

at Amiens last year, in which race the car finished eighth. The Excelsior racer is built near Brussels, Belgium, and has cylinders in two sets of three measuring 90 by 160 millimeters bore and stroke. Valves are on one side, two Claudel carbureters are used and a Bosch magneto is fitted. The crankshaft is carried in seven plain bearings, to which oil is delivered under high pressure. Transmission comprises cone clutch, four speed gearbox and shaft drive. Palmer tires have generally been used on the Excelsior racers and the wheels are always Adex detachable. Weight of the car is 1,980 pounds.

In the 850 cubic inch class Christiaens holds all the records. He has covered the half mile flying start at the rate of 108.30 miles an hour, the mile flying at 106.86, and ten laps standing start at 101.66 miles an hour.

The Sunbeam entry will be a six-cylinder car having a bore and stroke of 3.14 by 5.9 inches. While the chassis will be specially prepared to meet the Indianapolis Speedway conditions, the motor will be the one used to secure the world's 12-hour record. In this record a distance of 1,078 miles 460 yards was covered in 12 hours, standing start, being at the rate of 89.85 miles an hour. The average speed for 10 hours was 91.06 miles, and for 9 hours it was 93.43 miles.

Jean Chassagne, who was one of the three drivers when this record was established, is a Frenchman occupying the position of chief race driver and tester with the Sunbeam company. Before becoming a race driver Chassagne was in the French navy. He has visited America several times in connection with important road races, but always in the capacity of mechanic.



View of the exterior of the Peugeot motor

Timing Varies Through Wide Range

Representative Automobile Makers Have Diverging Ideas Regarding Time for Opening and Closing of Intake and Exhaust Valves

By J. Edward Schipper

SINCE valve timing is based on theory it is naturally to be expected that there will be a wide variation in the resulting practice. The theories advanced for different valve timings vary widely in many particulars and it needs but a glance at the accompanying table of representative examples to note the difference in opinion among the prominent engineers of the country.

While the beginning of the intake stroke is generally considered the commencement of the cycle of operation in a gasoline engine, it is hardly the starting point in laying out the timing diagram. The scavenging problem which has always been the bugbear of the internal combustion engineer has among its other phases its encroachment on the problem of getting enough gases into the cylinder to compose as complete a charge as the volumetric efficiency of the motor will allow. In other words, the closing of the exhaust and the opening of the intake must work hand in hand and it is this feature which causes the main variation in practice.

Of sixty-eight representative American cars of all classes 11.9 per cent. have the exhaust closing and the intake opening occurring at the same point; 66.6 per cent. have the exhaust closing taking place before the intake opening; and 21.5 per cent. have the intake opening before the exhaust closing. These three conditions are known respectively as zero, negative and positive lap.

While the average point for closing the inlet is 35 degrees past the lower dead center, cars which are in daily and successful operation have their intake valve closing all the way from 15 degrees past lower dead center to more than 54 degrees, a difference of 39 degrees on the flywheel representing a considerable travel of the piston.

Exhaust Opening Varies

The point of exhaust opening averages at 50 degrees before the lower dead center. In other words, in order that the piston will not have to work against more than atmospheric pressure on the beginning of its upwards stroke, the engineer calculates that while the flywheel is passing through an arc of 50 degrees the pressure will have dropped from somewhere in the neighborhood of 40 pounds per square inch

to 14.7 pounds per square inch, a drop of 25.3 pounds. While the engineer thinks that 50 degrees before bottom center is an early enough opening, others demand 10 degrees earlier than this notwithstanding the fact that 10 degrees at this point of the circle means a large percentage of the total piston travel. Going the other way engineers have opened the exhaust as late as 27 and a fraction degrees before bottom center.

Before going into the reasons for the variations in timing it must be understood that for every degree of travel as given in degrees on the flywheel, a different amount of piston travel will be the result during each quadrant of the flywheel circle. Starting at upper dead center and revolving 1 degree it will be noted that the motion at the lower end of the connecting rod is much more of a horizontal

than a vertical action, consequently, the piston has traveled only a small fractional part of its stroke. On the other hand, when the crank is in a horizontal position at mid stroke for every degree of travel, the motion is largely a vertical one and the piston therefore makes a correspondingly greater advance through its stroke.

This is brought out graphically in Fig. 4, which shows the correspondingly small travel of the piston through several degrees of advance on the flywheel when near the upper or lower dead centers.

Must Scavenge Motor

The proposition which confronts the designer when determining the time of an intake opening is that of making it as early as possible and still have his motor scavenged as well as possible. In order to scavenge the motor to the greatest degree it is necessary to hold the exhaust open as long as possible. In order to secure as much gas in the cylinder as possible, it is necessary to open the intake as early as possible, if we neglect for the moment the question of the inertia of the gas. Therefore these two factors are directly opposed to each other and a compromise has to be effected. The engineer does this by carrying the exhaust open to a distance of 9.3 degrees past the upper dead center and opening the inlet at 11.2 degrees past upper dead center. The 2-degree difference during which time the piston is traveling

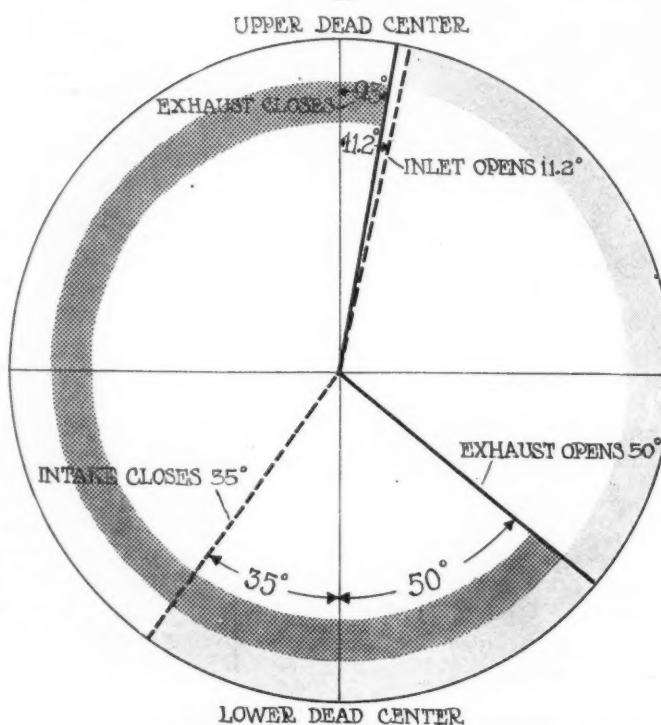


Fig. 1—Composite timing diagram of sixty-eight different cars. Inlet opens 11.2 degrees after top center; closes 35 degrees after bottom center; exhaust opens 50 degrees before bottom center; closes 9.3 degrees after top center.

down with both valves closed creates the vacuum in the combustion chamber which overcomes the inertia of the inlet gases when the inlet valve is opened.

While this is the average practice of the engineer, a well-distributed difference of opinion exists on both sides, as will be noted from the percentages given regarding the number using plus or minus lap. Instead of creating a vacuum by the piston with both valves closed, more than 11 per cent. of the engineers overcome the inertia of the inlet gases by a vacuum created through the outflow of the exhaust. In doing this the exhaust valve is held open for several degrees after the intake valve is open, giving in one case in which the name of the maker must be held confidential, a positive lap of 16 degrees and 20 minutes. In this particular case the intake opens exactly at top center and the exhaust does not close until 16 degrees and 20 minutes after top center.

This amount of lap is extreme and the next largest noted is that used in the Auburn car where 10 degrees is employed. On this car the intake opens at 6.5 degrees after top center and the exhaust closes at 16.5 degrees.

The Franklin car, which is a high-speed design with all the characteristics of the short-stroke motor, has a lap of 9 degrees. The intake opens at 8 degrees after top center and the exhaust closes at 17 degrees. All three of these cars have a moderately small stroke-bore ratio and consequently operate at relatively high rotative speed.

Must Delay Intake

The point of intake opening varies through several degrees past top center, but in the language of A. Dixon, engineer of the McFarlan Motor Co., "One can play with the intake opening and exhaust closing over a fairly wide range without materially affecting the running of the motor." The great object in delaying the intake opening to some extent is to overcome the inertia of the gas in the intake manifold. Were it not for the inertia factor, the theoretically correct time for intake opening would be at top center, but after noting all the available motors, it is found that there is but one maker who opens his intake valve at that point and that is the one above mentioned where the extremely late exhaust closing is noted. In this motor, which is a T-head design, the exhaust gases rushing through the valve on one side of the cylinder are relied upon to create a vacuum which will draw the intake gas through the valve on the opposite side. In considering this timing it would be supposed that the inlet gas would mix with the exhaust and a part of the charge would be lost. That this takes place, however, is improbable owing to the fact that a very small vacuum is created and the time is so short that such action can hardly occur to any extent. A thermal advantage is gained in that the charge is heated to some extent by the exhaust, thereby making use of a number of heat units that would otherwise have been thrown away in the exhaust.

The fact that two-thirds of the automobile manufacturers believe in creating a vacuum before the inlet opens by having

a short period of time elapse between that operation and the closing of the exhaust indicates that it is considered well worth the loss required both in the time of intake opening and in the slight loss of power due to the piston acting against a partial vacuum. The point to be remembered in this is that the piston travel is exceedingly slight being as stated in the average case only 2 degrees on the flywheel.

In determining the exact time of intake opening and exhaust closing on each individual make of car the personal factor of the engineer and the results of experiment on that particular design go to make up the decision. It is interesting to note that there does not seem to be so wide a variation between the small high-speed motor and the larger slow-speed type as would be expected. The timing of the Chevrolet H, is arranged so that the exhaust closes at 14.11 degrees and the inlet opens at 16.8 degrees after top center. This motor has a bore of 3.69 inches and a stroke of 4 inches. It is geared 4 to 1 on high and is a good example of the high-speed type.

The Simplex 38, a 4.875 by 6.5 motor, closes the exhaust at 7.83 degrees and opens the intake at 10.33 degrees after top center. Comparing these two timings there is very little difference, each having a negative lap. In the Chevrolet H this is approximately 2 degrees and in the Simplex it is a small fraction over 2.

The number of cylinders does not seem to affect the timing in any particular as is evidenced by the fact that the timing of six-cylinder motors in many cases closely approximates that of the four on both sides of the general average timing as shown in diagram Fig. 1.

Inertia Must Be Overcome

The number of degrees after top center that the inlet valve is held closed depends entirely on the engineer's idea as to what amount of vacuum it is necessary to create in order to overcome the inertia of the gases in the intake manifold and at the same time creating a high velocity through the port to assist carburetion to the greatest possible degree. This consideration taken with the piston speed at which it is required to secure the best efficiency must determine this part of the timing chart. The object is to get the biggest possible charge into the cylinders.

Commenting on the questions above brought out, C. H. Metz of the Metz company expresses himself as follows: "Ignoring entirely the question of the inertia of the gases the theoretically correct moment of closing the exhaust and opening the inlet valves would be when piston is at its highest point in the cylinder. In making allowance for the inertia of the gases, we must first determine at what piston speed the user seeks to get the best power result. Owing to the fact that our [friction] transmission permits of a very wide range of car speed ratios, the motor is relieved of these extremes, and in consequence, neither a plus or minus lap is desired. Seven degrees of late closing of the exhaust and opening of the inlet valves is found to give us the best average result."

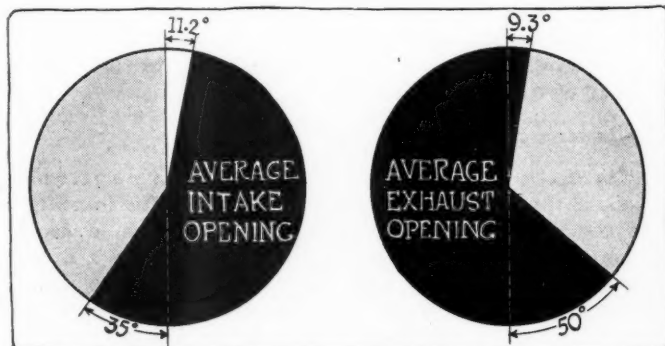


Fig. 2—Average intake and exhaust valve openings on American cars

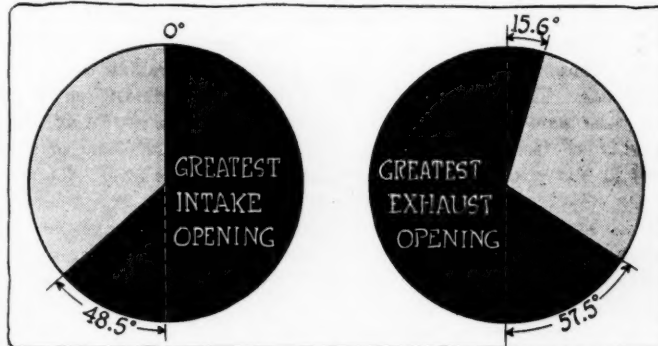


Fig. 3—Greatest intake and exhaust valve openings on American cars

Tabulation of the Timing Used on Representative American Cars

Car	Intake Opens, Degrees—Minutes	Intake Closes, Degrees—Minutes	Exhaust Opens, Degrees—Minutes	Exhaust Closes, Degrees—Minutes
Abbott 34-40	11-30 ATC	44-12 ABC	45-48 BBC	11-30 ATC
Abbott 44-50	17-53 ATC	29-25 ABC	42-36 BBC	8-20 ATC
Abbott Belle Isle	10-00 ATC	28-00 ABC	40-00 BBC	2-30 ATC
Allen 40	15-00 ATC	40-00 ABC	45-00 BBC	10-00 ATC
Cadillac 1914	4-20 to 14-20 ATC	38-26 ABC	31-34 BBC	7-00 to 17-00 ATC
Cameron 1914	5-00 ATC	20-00 ABC	50-00 BBC	10-00 ATC
Corbitt "D" "E" "F"	11-00 ATC	35-00 ABC	45-00 BBC	3-00 ATC
Pathfinder 4	11-30 ATC	44-12 ABC	45-48 BBC	11-30 ATC
Pathfinder Big 6	10-00 ATC	28-00 ABC	40-00 BBC	2-30 ATC
Pathfinder Little 6	10-00 ATC	28-00 ABC	40-00 BBC	2-30 ATC
Chalmers	12-00 ATC	33-00 ABC	55-00 BBC	12-00 ATC
Crescent	20-00 ATC	45-00 ABC	55-00 BBC	15-00 ATC
Chandler Six	14-00 ATC	39-00 ABC	49-30 BBC	12-00 ATC
Crane 4	10-00 ATC	35-00 ABC	50-00 BBC	10-00 ATC
Correja H	10-00 ATC	35-00 ABC	44-00 BBC	5-00 ATC
Chevrolet C	13-00 ATC	49-00 ABC	47-00 BBC	9-00 ATC
Chevrolet H2-H4	16-48-36 ATC	54-8-36 ABC	27-13-17 BBC	14-6-43 ATC
Case 40	13-00 ATC	30-00 ABC	50-00 BBC	13-00 ATC
Cunningham	15-00 ATC	15-00 ABC	40-00 BBC	12-00 ATC
De Soto Six	10-00 ATC	25-00 ABC	38-00 BBC	8-00 ATC
Franklin M No. 4	8-00 ATC	33-00 ABC	51-30 BBC	17-00 ATC
Great Southern	14-00 ATC	25-00 ABC	35-00 BBC	10-00 ATC
Haynes 26-27	5-00 ATC	35-00 ABC	47-00 BBC	2-00 ATC
Haynes 28	5-00 ATC	35-00 ABC	37-00 BBC	2-00 ATC
Hupmobile 32	21-00 ATC	28-00 ABC	46-00 BBC	16-00 ATC
Howard 6-D	10-00 ATC	28-00 ABC	40-00 BBC	2-30 ATC
Oldsmobile 54	15-00 ATC	38-00 ABC	45-00 BBC	10-00 ATC
Jeffery 6-96	18-00 ATC	46-00 ABC	47-00 BBC	15-00 ATC
Jeffery 4-93	18-00 ATC	46-00 ABC	47-00 BBC	15-00 ATC
King B	9-44 ATC	30-38 ABC	32-10 BBC	5-00 ATC
Krit M/K-M-KR	12-00 ATC	28-00 ABC	39-00 BBC	2-00 ATC
Lewis Six	15-00 ATC	30-00 ABC	45-00 BBC	5-00 ATC
Lyons-Knight K	10-00 ATC	40-00 ABC	60-00 BBC	on DC
McFarlan Six T	10-00 ATC	36-00 ABC	43-30 BBC	10-00 ATC
Maxwell 4-35	5-00 ATC	40-00 ABC	35-00 BBC	on DC
Maxwell 4-25	6-00 ATC	32-00 ABC	43-00 BBC	6-00 ATC
Moon Six 50	10-00 ATC	28-00 ABC	40-00 BBC	2-30 ATC
Moon Four 42	14-00 ATC	24-00 ABC	31-00 BBC	21-00 ATC
Marathon, Winner, Runner, Champion	12-00 ATC	45-00 ABC	46-00 BBC	7-00 ATC
Moyer E and G	8-00 ATC	40-00 ABC	45-00 BBC	10-00 ATC
Norwalk 6-C	6-00 ATC	40-00 ABC	45-00 BBC	5-00 ATC
Norwalk 6-D	8-00 ATC	40-00 ABC	45-00 BBC	on DC
Jackson, Olympic 40, Majestic, Sultanic	15-00 ATC	38-00 ABC	45-00 BBC	10-00 ATC
S & M	10-00 ATC	28-00 ABC	40-00 BBC	2-30 ATC
Pratt 50	12-00 ATC	45-00 ABC	45-00 BBC	10-00 ATC
Paterson 32 and 33	15-00 ATC	38-00 ABC	45-00 BBC	10-00 ATC
Palmer Singer Brighton Six L	6-00 ATC	40-00 ABC	45-00 BBC	5-00 ATC
Pierce-Arrow				
Paige Detroit 36	9-40 ATC	32-30 ABC	41-50 BBC	11-40 ATC
Paige Detroit 25	9-40 ATC	32-25 ABC	40-30 BBC	12-00 ATC
Republic E	15-00 ATC	30-00 ABC	45-00 BBC	10-00 ATC
Reo the Twelfth	18-00 ATC	36-00 ABC	53-30 BBC	14-00 ATC
Spaulding T	5-00 ATC	45-00 ABC	55-00 BBC	5-00 ATC
Simplex 38	10-20 ATC	31-40 ABC	54-20 BBC	7-50 ATC
Simplex 50	13-10 ATC	34-40 ABC	57-30 BBC	15-40 ATC
Selden 49	13-00 ATC	26-30 ABC	48-30 BBC	7-30 ATC
Touraine 12	3-00 ATC	40-00 ABC	43-00 BBC	3-00 ATC
Velle, 9-45, 6-40, 9-5, 9-4, 9-2, 6-5, 6-4	7-00 ATC	36-00 ABC	43-00 BBC	12-00 ATC
Velle 11-35	5-00 ATC	31-00 ABC	39-00 BBC	13-00 ATC
Vulcan	15-00 ATC	30-00 ABC	45-00 BBC	10-00 ATC
Zimmerman B-6	10-00 ATC	25-00 ABC	38-00 BBC	8-00 ATC
Speedwell A B C	10-00 ATC	28-00 ABC	40-00 BBC	2-30 ATC

Harold B. Anderson, Chief Engineer of the Winton company, building a car which is of a type which is in sharp contrast to the Metz, disagrees with the opening of the intake and the closing of the exhaust at the same time. Covering this point, he says, "The two most essential conditions in the timing are the opening of the exhaust and the closing of the intake, together with an interval between them. The interval, of course is essential.

An example in which a company has changed from a negative lap to a positive one, is offered in the Cunningham. On the table herewith it will be noted that the Cunningham has an intake opening at 15 degrees past top center and closes the exhaust at 12 degrees past giving a negative lap of 3 degrees. The object of holding the intake closed until 15 degrees past top center, according to V. E. Lacy, Chief Engineer of the company, was to avoid the possibility of the intake valve being open before the exhaust is closed. On the cars which are coming through the factory at the present time, an entirely new valve setting has been arranged in which the intake opens 10 degrees after top center and the exhaust closes at 20 degrees past top center. This gives a positive lap of 10 degrees.

In explaining the reason for making the change, Mr. Lacy said: "We were after more horsepower at high speed, that is, greater capacity of the motor to run at high speed. This was

easily attainable with the valve timing giving the positive lap but we were somewhat afraid that it would cut down the pulling power of the motor at low speed. After exhaustive and severe tests, we find that the new valve setting is materially better at all points of running. While the motors do not show any more horsepower at 800 revolutions per minute than with the old valve setting, they actually do hang on much longer when pulled down to a low speed on heavy load. This we find in actual comparisons on the roads, above 800 revolutions per minute, there is a very material increase in horsepower on the blocks which of course would be expected. The car shows a material increase of speed on the road." The Cunningham is a four-cylinder, 4.75 by 5.75 motor, geared at 3.43 to 1 on direct.

Volumetric Efficiency Affected

The question of volumetric efficiency has been a stumbling block in the way of many proposed timings. The inability to fill the cylinder with explosive gases results in a decided lowering of the mean effective pressure and hence a drop of horsepower. R. O. Gill, experimental engineer of the Chalmers, states that in making dynamometer tests with various proposed timings on their motor, the cylinders would not properly fill, thereby lowering the mean effective pressure with a corresponding decrease in the power output. Mr. Gill

further says that he is firmly convinced that the fine points of valve timing have to be suited to each individual motor, their different shapes of manifold, type of design, ignition timing, etc. The Chalmers motor has a zero lap at 12 degrees past upper dead center.

The closing of the exhaust and the opening of the intake is the key to the whole timing situation, and it is around this point on the diagram that the efforts of the designing engineers are centered. The Winton company using a 5-degree positive lap is an example of average practice on this point and the explanation of Mr. Anderson regarding the reasons for arriving at this conclusion are as follows:

"We close the exhaust a trifle after upper dead center, depending upon the inertia of the exhaust gases to produce the theoretical partial vacuum and more completely clear out the cylinder as the piston is going out. If the exhaust valve is closed a moderate retarding of the intake opening has absolutely no effect upon the volumetric efficiency of the engine.

"The retarding may be extended to possibly 40 or 45 degrees during which time a partial vacuum is formed in the cylinder, but immediately upon the opening of the intake valve the cylinder is entirely filled. The rest of the stroke of course is direct suction in the cylinder.

Make Timing Foolproof

"We have found that the 5 degrees existing between the closing of the exhaust and opening of the intake has no material effect upon the volumetric efficiency of the engine, and it does provide sufficient tolerance so that within the range of faulty adjustment by people not familiar with proper timing, the condition would not exist that the exhaust and intake valves were both open at the same time."

Some of the standard makers are holding the intake valve open to a much later point than the average. The Jeffery company is an example of this, the valve being held open on this motor until 18 degrees after top center, while the mean practice is 11.2 degrees. L. H. Bill, of the Thomas B. Jeffery company, in explaining this says, "Our reasons for opening our intake valve 18 degrees after top center is that we believe by creating a partial vacuum, we get a more rapid rush of gas and a better effect on the carburetor and at the same time by keeping the valve open until a later point, scavenge our cylinders better."

One more point which suggests itself on the timing of the inlet opening and which also holds true for other operations on the timing circle, is in the securing of a quiet cam. Quietness in the cams is generally secured at the sacrifice of power. A steep cam is as a rule more noisy and more powerful than one giving a slower opening. To secure the

full opening of the inlet valve at a point which will not be too late to permit a full charge to be taken into the cylinder, and yet at the

same time to have a cam which will not be noisy, means that the inlet opening will have to be started fairly early. This is one of the points which often induces a maker to sacrifice the vacuum to some extent for the sake of quietness.

Timing Affects Economy

As timing affects economy and economy has become an important question the automobile manufacturer will profit by turning the searchlight of his engineering force on this point. The mere fact that there is such a wide variation in practice on this detail is a sufficient basis to reach the conclusion that some makers could improve their power output by changing their timing.

Acetylene Welding Principles

The heat is produced by a mixture of gas, of more or less good calorific value, with oxygen. The gas is led from its source of supply through a flexible pipe into a burner, held in the hand of the operator, and oxygen is also led into the same burner in a similar manner. The pressure of the gas and of the oxygen is regulated with suitable apparatus. The proportion of gas and oxygen is adjusted by opening or closing their respective inlet valves on the burner, and means are provided in the burner to prevent back-firing. The gas and oxygen issue from the burner through a small orifice at the mouthpiece, and are ignited with a match, the proportions of the two being adjusted until a clear flame shows itself in a fine point. The work is heated by this flame at the welding point, and soft iron is melted into the joint to increase its thickness and strength.

Acetylene Is Best

With regard to the gas used for this class of welding, the author thinks the best is acetylene, but other gases are used in conjunction with oxygen, namely, benzole vapor, coal gas and hydrogen, the last being used more especially on the Continent, but acetylene, oxygen and coal gas can be used together. Acetylene and oxygen gases, however, form as effective a mixture as can be desired. Of the various systems, the author regards electric arc welding and oxy-acetylene welding as the two systems most suitable for general application, and the others for special work. In some classes of work the electric arc is the more suitable, and in others the oxy-acetylene system, while in some cases both systems are equally applicable. Each is more economical in its own sphere. Owing to the lower temperature, the oxy-acetylene flame is better for thin work than the electric arc, because the risk of burning the metal is not so great. The temperature of the electric arc has been calculated as about 7,500 degrees F., but will vary with the amount of current. That of the oxy-acetylene flame is about 6,000 degrees F.

In the author's opinion, the electric heat must be far more effective, however, because it is produced within the work itself, whereas the heat of the gas flame is applied entirely from outside.—T. T. HEATON, Institute Mechanical Engineers.

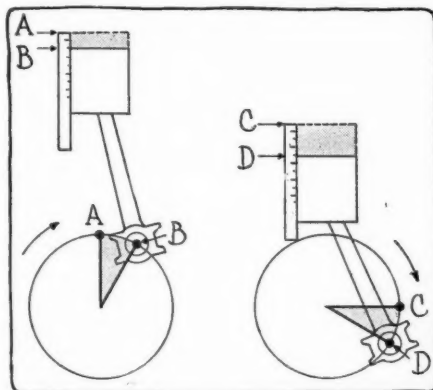
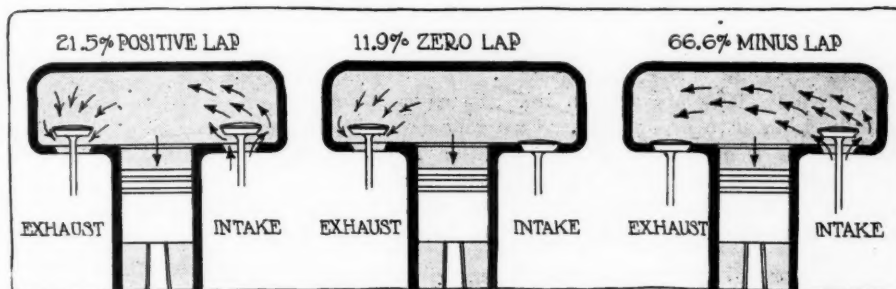


Fig. 4—Difference in piston travel for given number of degrees on different parts of crank circle

Fig. 5—Distribution of negative, positive and zero laps by percentage of total cars



The Engineers' Forum

Thinks Variables Obviate Value of Tests Considerably

BUFFALO, N. Y.—Editor THE AUTOMOBILE:—I have read with much interest the articles by Professor Marshall and Herbert Chase in THE AUTOMOBILE. There is, no doubt, much of value in such experiments. However, I think that there is danger of being misled by the many variables entering into these road experiments such as cold, or heat, humidity, or dryness of the atmosphere, altitude, gravity of the gasoline.

Mr. Chase, in his paper on A Comprehensive Motor Test read before the Society of Automobile Engineers, on page 169, Part II of the 1912 Transactions, states that the manograph shows very clearly that the combustion within the cylinder is seldom the same in two succeeding cycles. This is the writer's experience, even with tests conducted in test rooms under ideal conditions, and, though a general average may yet be struck, I doubt very much whether any better results can be obtained by the average automobile tester than can be had by taking a simple gasoline consumption test. If this is satisfactory then the combustion must be satisfactory and the exhaust gas analysis would of necessity be such that it would indicate a similar condition.

If the mixture is too rich it is indicated in several ways and the resulting gasoline consumption is heavy. If the mixture is too light the tester knows the symptoms and the remedy is generally obvious.

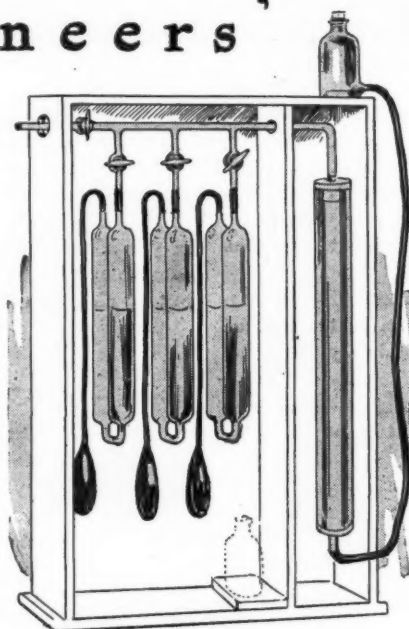
I think a gasoline consumption test would show these up and enable an average best result to be obtained quicker than it could be ascertained by exhaust analysis. The latter, no doubt, gives very valuable information in regard to whether a given gasoline consumption performance can be bettered on any particular car and would serve to indicate what changes should be made if complete combustion is not taking place.

It would scarcely be practical to take these analyses for all speeds and powers of the engine. If taken for only one speed, and carbureter adjustment were changed to give the best possible results at that speed, it might possibly interfere with the running at other speeds.—DAVID FERGUSSON.

Too Many Different Cars, Conditions, Etc., in the Tests

WORCESTER, MASS.—Editor THE AUTOMOBILE:—Briefly, it is my opinion that the average man is so entirely unfitted to produce maximum refinement in the performance of a motor car, and in addition is so indifferent to the possession of the last few points in efficiency, that the analysis of the exhaust gases in an automobile engine as a regular duty could not possibly inspire any interest in an operator.

In the first place, while it is admitted that exhaust gas analysis does show efficiency of combustion, and may also



The Orsat apparatus

Part II

This week appear the views of David Fergusson, David L. Gallup, Professor of Gas Engineering at Worcester Polytechnic Institute, Professor Marshall; C. W. Stiger of the Stromberg Motor Devices Co., and others.

Some Views on Exhaust Gas Analysis and Its Worth

be used indirectly to provide carbureter adjustments to effect the desired combustion, there are so many variables in the performance of a motor car engine that in order to properly apply the idea, it would be necessary to have constant observations made as to the make-up of the exhaust gases. This, of course, would prohibit all possibility of pleasure.

Conditions of the atmosphere as to temperature and humidity, quality of fuel, heat of engine, method of handling, are all in a way uncontrollable elements. Another item which is very important is the question of quality of lubricating oil used. This, by its combustion, can very materially change the results of the analysis and thereby mislead the conclusions of the observer.

In a laboratory, such investigations have their value, but even at that it is doubtful if the work entailed in obtaining the data is not much more than the value of that data.

Referring more particularly to the data recorded in the paper, it does not appear that the information given leads anywhere. Different cars, different loads, different conditions, in fact, nearly everything promiscuously different, provide a setting for an investigation which departs from all accepted rules. In any test for comparison everything should remain constant but the one thing under discussion, which when applied to this case would mean that one engine should have been used under all kinds of varying conditions including carbureter adjustments, after which definite conclusions could have been drawn as to the meaning of each change.—DAVID L. GALLUP, Professor of Gas Engineering, Worcester Polytechnic Institute.

Must Not Forget Load Conditions in Adjusting Carbureter

NEW YORK CITY—Editor THE AUTOMOBILE:—Naturally it was interesting to me to read in THE AUTOMOBILE for February 12 and 19 the deductions made by Mr. Chase from the tests on gas analysis which I made for your magazine. I hope it will wake up some of the men who know about car running and give them something to think about and experiment with.

Almost any man of average intelligence can tell when the carburetion of a car is bad by looking at the smoke issuing from the exhaust pipe, but I defy him to tell how good it is by the same method. This is where the gas analysis apparatus plays the important part. A carbureter can be adjusted by its use to attain the best results for any desired condition of running.

It is not necessary to collect the gas in a sample tube and transfer it to the laboratory, for the Orsat apparatus can be carried in the car and analyses made by first sucking the gas into the bottle and then transferring it to the Orsat on the spot. This enables the carbureter to be adjusted at once.

A point has not been brought out regarding the consumption of gasoline in the motor when the car is standing idle may explain the large percentage of CO in the exhaust gas. When a motor is running without load the throttle is nearly closed. This prevents a full charge from entering the cylinder on the suction stroke and therefore reduces the compression to 9 or 10 pounds above atmosphere.

The compressed charge fails to ignite properly, for flame propagation is hindered and at the time of exhaust opening the pressure of the expanded gas is either at, or below, atmospheric pressure. In either case burned gases are drawn in from the exhaust pipe and muffler, tending to stop further combustion. This partially burned mixture is expelled on the scavenging stroke and we find in the exhaust gas considerable CO.

Load Must Be Considered

If the carbureter is set to lessen this, it produces a bad effect when the motor is running under load. It is, therefore, poor policy to adjust the carbureter for good running when under no load and expect to get good results when running on the road.

The consumption of gasoline with motor running and car standing is commonly as large as the consumption when the car is running. If a chauffeur wishes to save gasoline he had better stop the motor if he stops his car for any length of time.

Makers of cars ought to test carbureters on the cars which they sell by the methods outlined in Mr. Chase's article and then make it difficult for chauffeurs to change the adjustment.

I do not think the rating of cars by ton-miles per gallon is a just one. Other factors of great importance enter in, as I hope to show in the near future, especially the resistance of the car to rolling.

The engineer who supplies himself with an accelerometer, an indicator and an Orsat apparatus is provided with all the things necessary for getting the greatest economy in fuel.

Garages Need Testing Apparatus

Garages should be provided with them fully as much as a physician should be provided with a stethoscope and thermometer.

I hope the general public may become interested enough in gas analysis tests to insist on having them, as well as a gasoline consumption test, made for each car bought.—W. C. MARSHALL.

Carbureter Maker Finds Consistent Results Difficult to Obtain

CHICAGO, ILL.—Editor THE AUTOMOBILE:—In our experience with exhaust gas analysis, as a test for carbureter performance on the road, we have found that, while this occupies an important place in our laboratory work, it is scarcely suited to road use. We find this quite a delicate form of test, in that even under the most favorable conditions it is difficult to get results which check consistently with each other, and with the indications obtained from other methods of observation.

With a portable apparatus, such as is commonly used for road tests, the quantities of gas measured are so small, particularly in the CO and O determination, that there is a still greater chance for error. If the samples are preserved and taken into the laboratory for analysis, there is time for the composition of the gas to change.

The greatest chance for error, in our opinion, would come in making deductions from the results of the tests. The unfavorable conditions shown might be due to defects of the carbureter itself, or they might arise from entirely independent causes, such as a deposition of the liquid fuel in the intake manifold, unequal charge distribution, which occurs

to some extent in very many motors, or variation in compression, ignition, etc., of the different cylinders. These might either affect the test directly, or they might make necessary an uneconomical mixture proportion, to give smooth operation.

Motors Have Different Requirements

It is a fact well known to those who have had experience fitting the same type of carbureter to different motors, that regardless of the chemical requirements for complete combustion, each motor requires some slight difference in mixture proportion through its lower range of power, and that satisfactory operation would not be obtained with a uniform relation of gasoline to air. We, therefore, believe that, while tests by exhaust gas analysis are valuable in research and laboratory work, for a practical analysis of carbureter action on the road, they have no advantage over the more convenient methods now employed.—C. W. STIGER.

Takes Exception to Statements on Methods of the French Designer

NEW YORK CITY—Editor THE AUTOMOBILE:—The compiler of the Engineering Digest department of THE AUTOMOBILE desires to take distance from the article on Methods of the French Designer appearing in THE AUTOMOBILE for March 12. This story is scarcely what the French call *documenté*; that is, it does not carry intrinsic proof to the effect that the ideas expressed portray an actual condition rather than the theories of the author paraphrased as descriptive of rules practiced by others; in this case the whole French industry. But the ideas set forth—in some instances quaintly, as will be noticed—cover much ground and cover it rapidly. There is a certain Shakespearean flow in the loose diction imparting to the reader if he is interested in the subject, a sense of pleasure somewhat of the same order as that obtained in a different fashion from an automobile when its swift progress unrolls a succession of changing landscape. This effect of fullness brimming over is fortunately somewhat marred by the vagueness of the ideas. There is, so to say, a mist over the landscape.

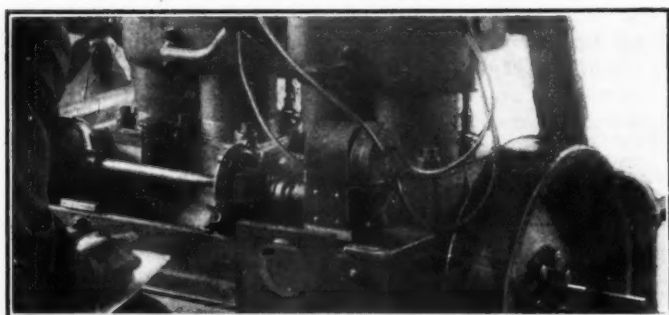
Defends American Quality

The statement that "in American practice quantity took precedence over quality" seems unjust, though it is qualified by the author afterwards (and thus conflicts with his own somewhat mysterious rule No. 4). In point of fact, American practice—meaning that of leading factories—has developed a method for incorporating a very acceptable degree of accuracy with large and rapid production, and this development has eliminated the undesirable and uncontrollable personal element very largely from the guarantees of accuracy, which means that an accuracy of a new and better sort was created here, one making replacements without special fitting possible for the first time in the world's industrial history.

That the courage to enter upon this new path for fine machinery was perhaps borrowed from successes of the same sort previously accomplished in the sewing machine and the stove industries does not matter or alter the facts.

Not for a moment should it be admitted, if only to be withdrawn or qualified in doubtful terms, that American practice in automobile construction has not done far more than any other practice, French, German or British, to raise the conception of industrial accuracy for automobiles to a higher and more sensible plane.

The "individuality" praised in the French car, when analyzed, is seen to be composed of nothing more meritorious than the workman's involuntary departures from the standard set for him by the designer.—M. C. K.



The Rostrum

More Discussion on Car Control

EDITOR THE AUTOMOBILE:—I have noted Mr. Canfield's criticism, in the February 12 issue, on the suggested system of control in which the spark is automatically timed by a governor, the throttle controlled by a foot pedal having a sidewise action in connection with a dashboard adjustment, the service brake applied by a prolonged action of the clutch pedal, and the emergency brake applied by a ratchet-controlled pedal.

There was a slight misunderstanding about the purpose of the dashboard adjustment. It is installed, in this case, to operate the motor throttle in connection with the pedal for starting, and not to adjust the carbureter. The clutch pedal is a divided construction so that one half operates the clutch, while the other, the service brake. This type of pedal has been marketed abroad and gives the use of service brake in connection with the retarding effort of a throttled motor as well as the desired combination.

As to the flexibility and accuracy of foot throttle control, I would say that I have given it a thorough trial for two years and it has been satisfactory, permitting the shifting of gears without the use of the clutch and possessing a rapidity and effectiveness that is not found in hand control. The pedal used was so constructed that the effective foot range of action was about three times that of the common accelerator pedal.

As to the operation of the emergency brake by foot, I see no reason why the pressure applied to a pedal could not produce sufficient braking effort to lock the wheels, if the brakes were so designed. The construction of the pedal suggested is such that the ratchet is engaged or disengaged by the action of a pivoted pedal plate. When the pedal is forced down by the foot at its natural angle, the ratchet (with the aid of a spring) is held in engagement, and disengaged by a depression of the heel, which changes the angle of the pedal plate on its pivot. In this case, there would be two definite actions of the foot; a toe-ward or natural pressure for en-

gagement of the ratchet and a depression of the heel for release.

I will now endeavor to show the merits of this arrangement of controls in actual service, with regard to its efficiency and resulting safety and economy. The throttle is slightly opened by the dashboard adjustment and the motor started. The spark is timed automatically and requires no attention from the driver. The gears are changed by one hand, while the other is used solely to steer, as the throttle is foot controlled. The service brake is immediately in command because one foot is operating the clutch, which pedal also operates the service brake. The driver has entire control of the car while starting because each hand and foot has but one thing to attend to and all effective movements are reduced to a minimum. The foot throttle control has more advantages than one. It will close of its own accord if released, and in this one fact is a profound element of safety in that the driver will unconsciously remove his foot from the "power" pedal to apply the emergency brake.

This system will also permit both hands to be free to grip the steering wheel while driving fast, a thing that is to be desired since no steering gear is irreversible, so that in case of a bursting tire, a sudden turn or unseen obstacle, the driver will be in the best possible position to keep the machine on the road or to use his judgment unhampered.

This control system varies in many respects from the standard and is due to meet certain opposition, presumably because its merits, as above stated, are not fully comprehended. Mr. Canfield's criticism pertains largely to mechanical details which the benefits of service in the hands of car owners in general, would perfect more fully than I have. The most important issue is the arrangement of the different controls for efficiency, safety and economy, in reducing the controlling movements to a minimum and in producing a simplicity that will eliminate confusion.

Cranford, N. J.

H. L. COLLINS.

Description of American Fuel Feed

Editor THE AUTOMOBILE:—Will you please explain the principle of operation and the care of the fuel feed system used on the model 34-A American Tourist?

Brockville, Ont.

B. F. H.

—A diagram of this system, which belongs to the pressure feed class, is shown in Fig. 1. Gasoline is forced from the tank to the carbureter by air pressure ordinarily supplied by a small pump that is driven from the camshaft operating the inlet valves. A hand pump is fitted for supplying pressure for starting. The air line runs up through the tank and has its opening near the top of it.

The tank is fitted with a reserve supply. When running on the main supply, gasoline flows through the stand pipe opening until the level falls to the top of the stand pipe, when

the remainder of the fuel cannot be used until the position of the three-way cock is changed. This cock is the one nearest the driver's seat, the other one being a drain cock for emptying the tank. Turning the handle of the three-way cock until it is horizontal, pointing away from the driver's seat, shuts off the gasoline supply from the carbureter; turning it until it points straight down, opens the regular supply; while turning it until it is horizontal, pointing towards the driver's seat, opens the auxiliary supply.

In starting, the three-way connection at the base of the hand pump should be opened and the pump operated until 2 pounds pressure is registered on the gauge. This will supply gasoline to the carbureter until the engine gets under way and air is furnished by the engine-driven pump. This is a plunger pump operated from an eccentric on the front

end of the intake camshaft, and in case it does not deliver air at 2 pounds pressure it can be adjusted as follows: If the pressure is too great, the lock-nut under the cap of the pump should be loosened and the cap screwed counter-clockwise. If the pressure is too low, turn it in the opposite direction. It takes two complete turns of the cap to vary the pressure 1-2 pound. The pump should be lubricated frequently and to do this oil should be squirted into the intake port of the pump. This port will be found on the side nearest the motor.

The piping joints should be examined occasionally for air leaks and every two months the tank should be drained.

Construction of Willard Storage Battery

Editor THE AUTOMOBILE:—I have just purchased a 1913 Studebaker six-cylinder machine which is known as model 6. I would be pleased to have you describe the construction of the storage battery used on this car and also wish you would tell me how to care for it.

Bridgeport, Conn.

K. H. KIEFER.

—The storage battery used on this machine is an Lba made by the Willard Storage Battery Co., Cleveland, O., and a section through it is shown in Fig. 2. The plates occupy the large central space indicated in the cut and these are connected to the battery terminals, one of which is designated by the letter B. Alternate plates are connected to the positive and negative terminals. The battery terminals are covered with a layer of pure Para rubber vulcanized directly to the corrugated surface of the conductor to prevent the acid creeping out of the jar and corroding the metal parts of the terminals.

The lining of the jar that comes in direct contact with the acid is made of semi-flexible Para rubber and outside of this is a plastic sealing compound indicated by the letter D which surrounds all joints and acts as a cushion. Outside of this again is a hardwood case with dovetailed joints. A dovetailed expansion joint is shown at E. High mud spaces are indicated at C, these being for the purpose of catching the mud as it falls from the plates. These compartments are made deep so that there is no danger of the material filling the spaces and short-circuiting the plates. A vent for the escape of the gases and the expansion of the liquid is shown at A. Above this passageway is a chamber into which the liquid can rise when it expands.

The battery should be examined every two weeks to see that the liquid covers the plates about one-quarter of an inch. To do this it will be necessary to take off the caps that cover the cell vent holes and then lift the lid off the battery case. Only distilled water should be used. If it is im-

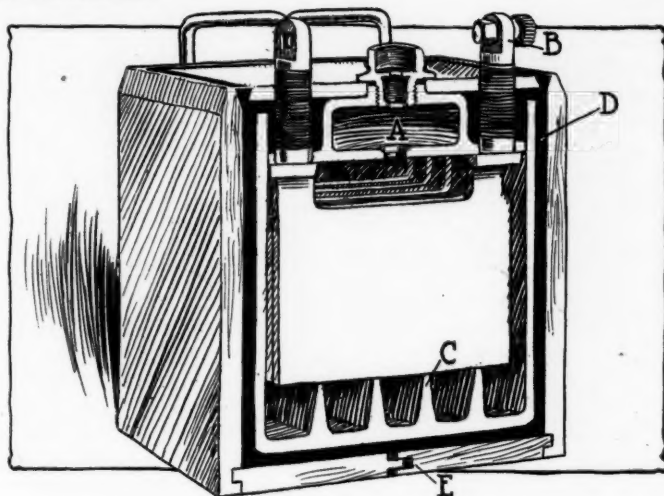


Fig. 2—Section through the Willard storage battery

possible to obtain this, use clean fresh rain water. Ordinary drinking water contains mineral salts which will damage the battery.

The specific gravity of the liquid when the battery is fully charged should read 1.28 to 1.3 per cell. If it is lower than 1.25 the motor should be run at a speed corresponding to a car speed of 15 to 20 miles per hour until the gravity is normal again. If it is inconvenient to run the motor long enough to do this, the battery should be removed from the car and charged at the rate specified on the nameplate. If it is impossible to bring the gravity up or if some of the solution has been spilled more solution will need to be added. This solution should consist of one part sulphuric acid, chemically pure, and three parts distilled water. Be sure to add the acid to the water, and not the water to the acid. The latter method will cause a serious explosion.

Adapting Generator to Lighting Work

Editor THE AUTOMOBILE:—Will you please explain to me how I can get better results out of a dynamo?

I have a direct current dynamo, 6 volts, 6 ampere, speed 2,200 revolutions and the make is a K & D. I have attached it to a six-cylinder engine and have a 3-inch pulley on the pump shaft that drives it. The one on the dynamo is 1.5 inches in diameter and is driven by a round belt.

All lights on the car are electric except the headlights which are gas. The dynamo lights all the lights but not very steady. It was not specially designed for an automobile.

Is the dynamo large enough to charge a storage battery and how would I connect it up with the battery?

Orange, Mass.

FREDERICK H. NEWMAN.

—It is hardly advisable to attempt to adapt the generator you have so that it will furnish current for your car lights. In order to obtain satisfactory operation of this generator in connection with a storage battery, it will be necessary to fit a cutout and in addition some means of regulating the voltage with the varying speed.

The cutout would not be very difficult to make, but a voltage regulator would be. The cutout consists of an electrically controlled switch that breaks the circuit when the generator voltage is so low that current would flow from the storage battery to the generator, and which will close the circuit when the generator speed increases to a point at which the voltage is higher than that of the storage battery. The cutout has two coils, one which consists of many turns of fine wire and which is connected across the terminals of the generator, this is known as the voltage coil. As the voltage increases the magnetic force generated by this coil increases until a point is reached, where the attraction of this coil closes the cutout switch. On the same iron core

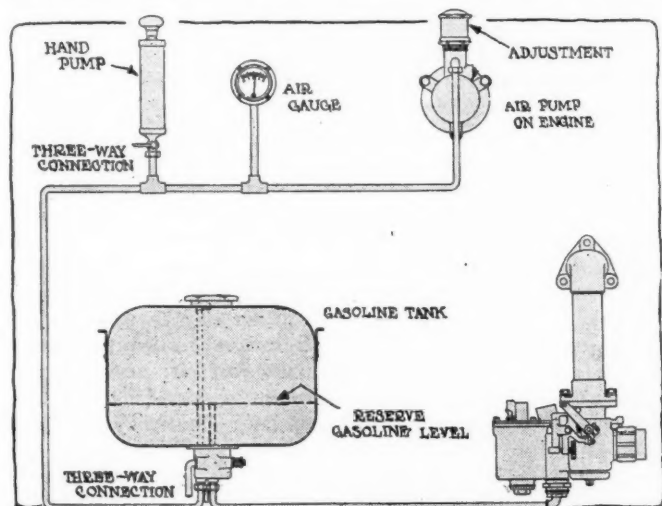


Fig. 1—Pressure fuel feed system used on American Tourist. Air pressure is supplied by a plunger pump driven by the motor

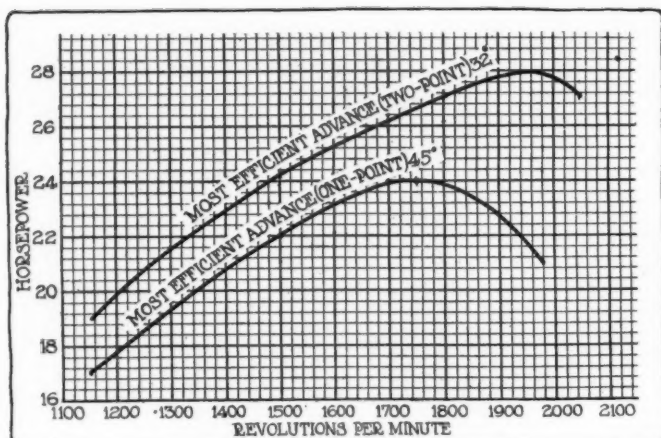


Fig. 3—Horsepower curves, showing increase in output on a T-head motor due to two-point ignition

with this coil, there is wound a current coil that is in series with the generator. When the cutout switch is closed, current flows through this coil and aids the voltage coil in holding the switch closed, but when the speed of the generator drops so low that the current reverses and flows from the storage battery to the generator, the current in this coil is reversed, so that the magnetic force produced opposes that generated by the voltage coil until finally the attraction of the voltage coil for the cutout switch is entirely overcome and contact is broken.

It is seen that the construction of this mechanism is quite simple and it would be easy to make such a device but the construction of a voltage regulator is quite out of the question.

Generator Not Designed for Car Lighting

Another difficulty in the use of this generator is that it is designed to give 6 volts at 2,200 revolutions per minute, and if it were geared so that it ran at this speed at ordinary motor speeds it would run too fast when the motor speed was increased. Therefore, it would be necessary to fit a centrifugally controlled clutch that would slip as the motor speed was increased so that the generator would still run at 2,200 revolutions per minute. This governor controlled clutch would be difficult to build. The conclusion reached is that it would cost more to make the necessary appliances that would be required for the satisfactory performance of the generator than it would to buy a complete, new system.

Two-Point Ignition Increases Power

Editor THE AUTOMOBILE:—Would I get more speed and power, or what advantage is there in having a magneto using eight spark-plugs on a four-cylinder motor? I have a Mercer machine.

Lyndhurst, N. J.

J. J. H.

—The use of two-point ignition will increase the power of the motor a certain amount, depending upon the shape of the combustion chamber, especially at high speeds. This is due to the fact that the time required for flame propagation may be reduced as much as one-half. The function of an ignition system is to raise certain particles of mixture to such a temperature that they will ignite and from this combustion center the flame spreads throughout the mass until all the particles are consumed. It is obvious that if ignition occurs simultaneously from two plugs properly located in the combustion space the time required for the complete burning of the mixture will be reduced. The success of the system, however, is dependent very largely on the location of the spark-plugs. If they are placed in close proximity, as for example one vertically in the inlet valve cap and the other horizontally in the side of the same pocket there will

be no noticeable difference in the performance of the motor, but if the spark plugs are located at widely separated points, as will be the case when one plug is over the intake valve and the other over the exhaust on a T-head motor, it can be seen that the time of ignition must be cut in half.

Some time ago a four-cylinder motor 3.5625 by 4.75 bore and stroke, was tested with a two-point Bosch magneto controlled by a switch that permitted ignition by either of the two series of plugs. This gave a ready means of comparing the power output of the two systems. Fig. 3 shows the difference in power produced by the two systems when the advance was set at its most efficient point. It will be noted that with two-point ignition, the maximum horsepower is 28 and this is obtained at about 1,960 revolutions per minute, while with single-point ignition 24 horsepower was the maximum, this being produced at 1,750 revolutions per minute. Thus it is seen that the horsepower increase is over 15 per cent.

Leather for Emergency Bearing Repairs

Editor THE AUTOMOBILE:—Quite often a machine will burn out an engine bearing in some place where a tow car is not available, and where there is no possibility of making a permanent repair. In this case a temporary repair can be made that will enable the owner to reach home without any damage to his motor. This is done by taking a piece of old leather belting, a large strap, or if necessary the sole of a shoe and inserting a piece of this leather to take the place of the babbitt that is melted out. The leather is cut to the shape of the bearing and then the cap is tightened up. This repair will be found satisfactory in every way, the leather having sufficient strength to stand up for a long while.

Willows, Cal.

J. G. TENNEY.

Direction of Rotation of Magnetos

Editor THE AUTOMOBILE:—1—How can I tell a magneto that is designed to rotate in a clockwise direction from one that is to run the opposite way?

2—How can I change a clockwise magneto into an anti-clockwise magneto?

3—Can you tell me how to set a Bosch magneto on a 1906 Fiat which had a make-and-break system with an automatic advance gear? I have done away with this system and wish to use a high-tension magneto, but am still retaining the automatic advance gear.

Prides Crossing, Mass.

A. W. D.

—1—The method of telling whether a magneto is to rotate clockwise or anti-clockwise depends entirely on the make of magneto. There is no general rule that can be applied to all makes. Some magnetos have a mark on them to indicate the direction of rotation. This mark is generally on the side to which the driving gear or coupling is attached. Sometimes an arrow is used and sometimes a letter or number.

As a rule it is possible to ascertain the direction of rotation from the construction of the breaker box mechanism. It is common to separate the breaker points by the movement of an arm that is actuated by a cam. In this case the cam should rotate so that when the arm is moved a tensional stress will be imposed on the arm, as it has been found that the wear on the parts is less when the force is in this direction.

2—The method of changing a clockwise magneto into one that rotates in the other direction depends on the make of magneto, and while it is a simple operation, it should not be attempted without obtaining detailed information from the maker as to just how it should be done.

3—The Fiat company does not advise the use of the automatic advance gear employed on the 1906 machine in connection with a high-tension magneto. It would be better to remove the governor parts and either use a magneto with

an automatic advance incorporated with it or else one with hand control. If the latter is used, a simple way of fitting an advancing mechanism would be to employ a Bowden wire cable such as is used on motorcycles for this purpose.

The automatic gear is easily removed by taking out the governor weights and then bolting the cam gear and the governor driving gear together.

How to Repair Bent Fenders

Editor THE AUTOMOBILE:—Will you please describe in the columns of your paper the best method of straightening automobile fenders and if there is any way whereby the small dents can be removed to the extent that they will not show when the surface is repainted and varnished.

Palo Alto, Cal.

G. H. CLEVENGER.

—In fixing a bent fender the first thing to do is to bring it as near to its original shape as possible by bending it by hand and after this is done the small dents can be removed by beating the metal with a mallet and a wooden block. The block is held against one side of the fender and the metal is beaten until a comparatively smooth surface is contained. The idea in straightening the fender by beating it repeatedly is to reduce the dents in size and increase their number to such an extent that when the fender is painted it will have a smooth surface and look as good as new.

The shape of the wooden block to use in this process depends on the shape of the fender. The wooden block used must conform to the shape of the part of the fender that is to be straightened, as nearly as possible. In other words, if a flat place in the fender is to be fixed, then a flat block with slightly rounded edges will be used, while if the fender is curved, a block should be made to fit this shape.

Adjusting Wear in Ball Joint

Editor THE AUTOMOBILE:—Will you please tell me how to take up the wear in the ball joints on the steering rod?

Indianola, Ia.

J. A. STORY.

—A common ball joint construction is illustrated in Fig. 4. The ball is held between two sockets, one of which is forced against the ball by the heavy spring at the left and the other is held by the castellated nut at the right. Lost motion can be eliminated by screwing up on the nut, as this moves the socket adjacent to it to the left and thus reduces the play of the ball in the joint. The nut is generally held by a cotter pin alone, but in this particular joint additional security is gained by clamping the nut by tightening up on the bolt shown at the lower right.

Wants Clutch That Engages Easily

Editor THE AUTOMOBILE:—Will you please inform me if there is a clutch on the market which will not grip, that is, one that will only engage slowly, even if the clutch pedal is released quickly?

Ladonia, Mo.

E. A. PARKER.

—We know of no clutch that will engage easily no matter how quickly the clutch pedal is released. It would be possible to build such a clutch, although we cannot see why such a construction would be desirable because it is not difficult to let up on the clutch pedal gradually.

One way of making this clutch would be to insert a long helical spring between the driven member of the clutch and the gearbox so that, although the clutch would take hold instantly if it were engaged very quickly, the drive to the rear wheels would be cushioned by this spring to such an extent that the car would move off gradually.

Another thing that might be done to obtain the same result is to loosen up on the clutch adjustment until a point is reached where the clutch will slip sufficiently, no matter how quickly engaged, to give the car a smooth start. Of

course, this is not to be recommended because it wears out the friction members of the clutch, yet it is one way of giving easy engagement under all conditions.

The ideal clutch is not one that is smooth in its action no matter how much it is abused, but one that will give a smooth engagement when properly used, that is, when the clutch pedal is released slowly.

Reader Diagnoses Motor Troubles

Editor THE AUTOMOBILE:—In the February 26 issue of THE AUTOMOBILE, H. W. M., of Bosworth, Mo., writes that after a broken connecting-rod had been repaired, a roar or grinding developed, very much like gears meshing too deeply. As he also states that this can be heard very distinctly with each revolution of the motor, it is not a continuous grind. My opinion is, that when the connecting-rod broke it bent the crankshaft, thereby causing the timing gear on the crankshaft to run out, coming in mesh too deep with the camshaft gear once every revolution of the crankshaft. This is all the more probable, as it was a number one rod that broke—the nearest one to the gear.

It is also possible that the broken rod hit the camshaft, thereby bending it and causing the camshaft gear to run out.

The easiest way to determine which gear runs out is to place one hand on one of the valve springs, while the motor is running on low throttle. If the noise keeps time with the movement of the valve, then the camshaft gear runs out. If the noise occurs twice as fast, it's the crankshaft gear, since the crankshaft turns twice as fast as the camshaft.

New York, N. Y.

FRED BERGER.

A New Way to Patch Tubes

Editor THE AUTOMOBILE:—It is an axiom that patches can not be depended on unless vulcanized, but here is a method which makes them easy to put on and makes them hold as well as a vulcanized repair, without the objection to the vulcanized repair that it takes the life out of the rubber.

When a puncture or cut is to be repaired, the tube and patch are cleaned as customary, and after the cement on the tube has dried, but before the patch is put in place, a pill of "Tire Dough," or a similar lump of dried rubber cement is put over the hole, the edges of which should be as close together as possible, but not overlapped. The lump should be about an eighth of an inch thick, and need not be any thicker for a long cut than for a small one. The edges should then be pressed on until thin, after which the patch is put on in the usual way.

Washington, D. C.

J. W. H.

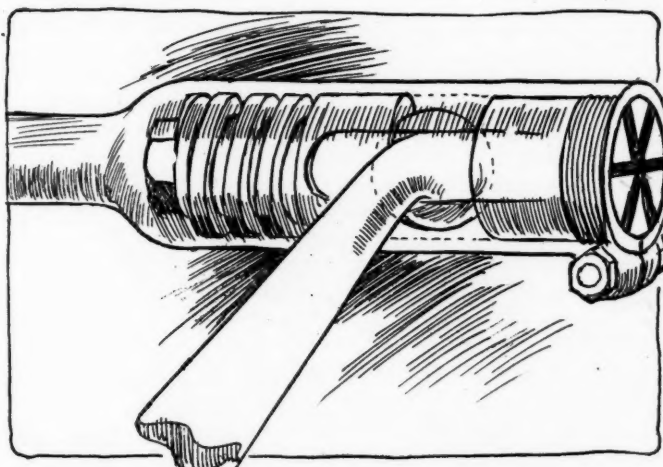


Fig. 4—Construction of ball joint used on steering rod. Wear is taken up by screwing up on the nut at the right



The Engineering Digest



All the Noises in the Street Traffic, Their Causes and Means by Which They Could Be Reduced

CHEAP CONSTRUCTION THE CHIEF OFFENSIVE FACTOR

WHILE the silent operation of a vehicle involves some dangers, especially in places where unremitting attention is not compelled by the density and speed of the traffic, the din or sum total of street noises is not only a disagreeable feature of city life but it is questionable if it is not more dangerous to the weaker members of the traffic than any other factor because it deafens the ear to the separate and warning noises through which real dangers would otherwise first be located. The din, however, is made up of a large number of individual sounds and can be reduced only by tracing each of its constituent noises to its source and removing the cause when it is found.

These considerations lead *The Engineer* of London to pass in detailed review all the mechanical elements in motor cars to which noise is due and the means which have been found suitable for quieting them, the fact that some cars are perfectly quiet being taken as justification for the demand that all cars shall be made so. It is admitted that the silencing of a vehicle raises its cost of production and that for this reason it may not be practicable to enforce the suppression of all noisy elements through public regulations and restrictions, but it is held that a goodly percentage of the causes of noise could be eliminated without hardship to either maker or buyer and that they may remain only because the responsible authorities have not yet realized how easily they can be removed.

The noises are divided into those (1) arising from the engine, (2) from the transmission, (3) from vibration, due to both engine and road, and (4) from contact of the wheels with the road. Electrical vehicles are considered as being beyond criticism in comparison with other types.

Vehicles drawn by horses and fitted with iron tires are recognized as being guilty of the greater volume of deafening clatter in the traffic, and for this reason as well as by their lower speed, which fits poorly with the higher speed of the motor vehicles—causing many swerves which without them could be avoided and frequently blocking the transverse passage for pedestrians—they might be singled out for attack in a campaign against noise, but they are fast disappearing and the automobile movement is in itself the most suitable means for eliminating this source of noise. The discussion is therefore limited to the noises caused by motor vehicles. A much abbreviated account of the causes mentioned and the remedies suggested is given in the following.

Noises from Gasoline Motors

In poppet valve motors the standard construction makes more or less clatter in 5 places, as indicated in Fig. 1: namely, (1) where the tappet strikes the valve stem, (2) where the valves fall upon their seats, (3) where the cams strike the rollers, (4) where the rollers fall upon the cams, and (5) where a side movement of the tappet, striking against the

guiding, occurs, due to wear. If only one of these causes is active, a four-cylinder motor emits 3,000 slight knocks per minute at a speed of 750 revolutions, and they unite into a continuous hum or roar which is heard as proceeding from the bonnet. The boxing of stems and covers for the valves do not prevent the noise but reduce the wear which in time would make it worse. The more radical remedy to be combined with boxing and covers consists in the reduction of tappet clearance and valve lift, in easy contours of the cams, springs or other means for maintaining constant contact between valve stem and tappet, long valve springs and fiber insertions for the tappets. A construction such as that indicated in Fig. 2, by which the moving parts are submerged in oil, or the better known means shown in Fig. 3 both seem suitable. The oil reduces wear and while it transmits sound it deadens vibrations by its mass and by the film interposed between the knocking parts. To enclose any moving part in a thin sheet-metal casing, with the idea of confining the noise within it, is absolutely useless. The sides of such a casing must either be so stout as to resist vibration or the casing must be filled with oil.

The noise of camshaft gears can be almost entirely obviated by means of silent chains and less completely by accurate workmanship and design to gear teeth.

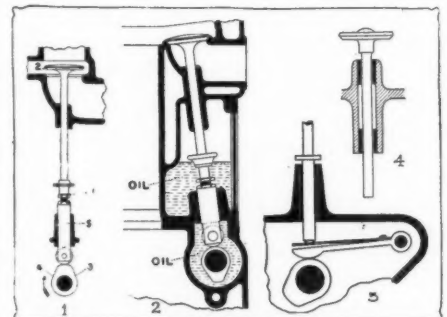
Single-cylinder engines used for motorcycles, though they have only two tappets, usually cause more valve noise than a large motor, for which fact high speed coupled with abrupt cam design is responsible; boxing is seldom employed and the exposure of the parts to road dust aggravates the evil by the wear it causes.

Noises due to the exhaust can be entirely obviated and it is difficult to see any good reason why some of the smallest vehicles, particularly the motorcycles, are permitted to cause more noise in this manner than a heavy truck does. In all these cases the mufflers are of inadequate size. Regulations with regard to muffler capacity and the thickness of the material used in them would be beneficial to the public, and a noise test might be established.

In some cases the exhaust causes a disagreeable hissing sound before reaching the muffler. It is due to worn valve steam guides, the gas escaping through the clearance, and occurs naturally mostly in old vehicles. A guide with two short bushes and a space between them, as shown in Fig. 4, reduces this kind of noise somewhat.

The thickness of the exhaust pipe walls may play a part in the exhaust noises, but as cars are made which are entirely silent it should be easy to formulate standards by which all vehicles may be made unobjectionable. In some instances duplicate mufflers would serve the purpose.

In sleeve-valve motors the most prominent noise is that caused by the suction of air through the carbureter, the other ones being all eliminated in ac-



Figs. 1-4—Illustrating the silencing of poppet valves and hissing exhaust

tual practice. In poppet valve motors it would become noticeable under similar conditions. While it is not very objectionable, it could be obviated by fitting a suction-silencer to the carbureter.

Some motor noises are intermittent. Among these, explosions in the exhaust box are the most severe, and no better remedy has so far been suggested than that of placing a series of gauze screens in the exhaust pipe, preventing flame from entering the muffler, but such screens would soon become clogged. To obviate the popping of carbureters it is necessary to look forward to suitable improvement of carbureters and carburation.

Noises from the Transmission

The elements, of which two or more are usually employed in combination, are spur gearing, bevel gearing, worm gearing, chain gearing, friction gearing, belt gearing, hydraulic transmission and electric transmission.

So long as two parts, spurgears or jaw clutches, with unequal peripheral speeds have to be thrust into engagement, so long must there be a great deal of unpleasant clamor at gear changes. The motor omnibus with its frequent stops to pick up passengers must remain particularly offensive in this respect until a practical silent gear change system shall have been devised, as great skill or care in the operating of clash gears can scarcely be expected from the omnibus drivers, any more than from the taxicab drivers. Only the electric transmission and the hydraulic system promise relief from this source of noise which is at worst intermittent. The constant noises caused by gears running in mesh are after all more important. The London General Omnibus Company has solved the problem of noisy gears, in this sense, in the most satisfactory manner; namely, by using silent chains instead of toothed gearing. It is perhaps possible to manufacture a perfectly silent gearbox having nothing but spurgears, but it is unlikely to remain silent unless very carefully treated and attended to. The silent chain system, on the other hand, has the excellent property that wear of the teeth does not cause noise and that badly worn chains can be easily replaced.

In the matter of gear noise, motor cabs are among the worst offenders. Once they become noisy a remedy is all but impossible. Perhaps the gears are too small in the first place or the teeth imperfectly cut; perhaps the shafts are not sufficiently stiff, or the gear boxes may be of too light construction—all with a view to low first cost. One maker, it is known, used to throw a gearbox into the scrap heap rather than attempting to silence it, and we hear of sprinkling sawdust among the gears as a last resort. The better remedies, if spurgears are to be used, go back to the design and consist in accurately cut gears, short and rigid shafts, suitable pitch diameters, a rigid box and the use of fairly thick lubricant. Something may be gained by disengaging the lay shaft when the drive is direct, as in early constructions.

With reference to the rear axle and the bevel gear drive, it is silent in first-class touring cars but noisy in vehicles of lower class. It is again the original design which is involved, practically the same considerations arising as for the spurgears. The best solution, though an expensive one at present, lies in the adoption of the worm drive. Something may be done by choosing the right lubricant. Oil is generally used, because it always reaches the teeth, but grease is a better noise preventer. A mixture of oil and grease has both advantages but is said to absorb power.

It is noticed that high-speed pinions with only 10 or 12 teeth are particularly noisy, and pinions with so few teeth are now found in the lighter class of motor vehicles only. In the case of transmissions in which the last drive is by roller or block chains, the noise is rarely objectionable unless the small sprocket pinion is made of too small diameter in order to get a high speed reduction. Chain casings serve to protect somewhat against road dust and slush, but if made of

light sheet metal are more likely to act as a sounding board than as a muffler of noise.

It is suspected that the differential pinions may sometimes be responsible for noises charged to the bevel gear pinions, as the differential is seldom entirely at rest, even on an apparently straight course.

On the whole, the reduction of gear noises in the traffic is difficult to bring about with regard to vehicles already in operation, and reliance must be placed for the future in the wider adoption of elements which are by nature silent, viz., silent chains, worm drive, electrical and hydraulic transmission systems.

Noises Due to Vibrations

Motor bonnets made of thin material are probably in most cases noise makers rather than dampers of noise. As they are not flat in any place, they probably act somewhat like a tin plate when it is buckled in or out under light pressures. Possibly, if the sides of bonnets were dished or corrugated, their rigidity would be so much enhanced as to obviate vibrations. In fitting it to the dashboard and to the radiator, leather joints and spring catches are very helpful to prevent rattling. Wherever two parts are liable to vibrate one against the other, it would be wisdom to arrange invariably some elastic insulation between them.

[In discussing the noises arising from the rotational contact of different kinds of wheels with different kinds of road surfaces, the observations made by the author are all obvious and without profitable application to automobile construction, while remarks made upon the possibility of toning down the sounds used for alarm signals bear directly upon the subject only in so far as alarms naturally can be toned down considerably as soon as the general din of the traffic shall have been subdued by silent construction of the vehicles composing it and by the improvement of road surfaces.—ED.]—From *The Engineer*, February 13, 20 and 27.

Built-Up Welded Omnibus Wheel

AN interesting design is noticed among British patents under the classification of Wrought Metal Wheels and is shown in Fig. 5. The patent is issued to L. Brown and Charles Macintosh and Co., Ltd., of Manchester. The spokes A are formed of T-sections, and these may evidently be composed of two pieces of sheet steel, if preferred, flanged along the edge which is to supply the transverse rigidity. The shape of a piece constituting one-half of a spoke is indicated by shading. These half-spokes are assembled in pairs by riveting at B and welding at C. The hoop D is welded upon the outer ends of the spokes and the joints EF are also welded. The inner ends of the spokes are riveted between two flanges G which are suitably swelled at H to make room for the spoke flanges. The abutting faces of two half-spokes are recessed, as indicated in the cross-sectional figure J, and a key is inserted in the double recess to prevent the parts from moving relatively to each other. Hollow bosses K may be formed as shown to serve for the attachment of a driving-ring and brake drum.

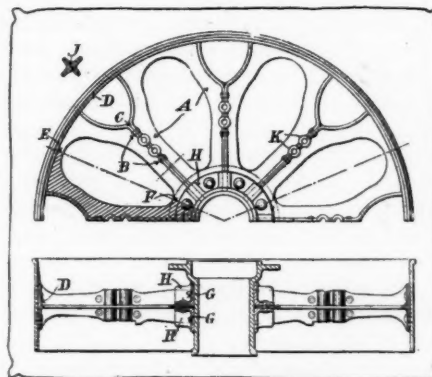


Fig. 5—Built-up wrought-metal wheel

A Machine Which Tests for Hardness

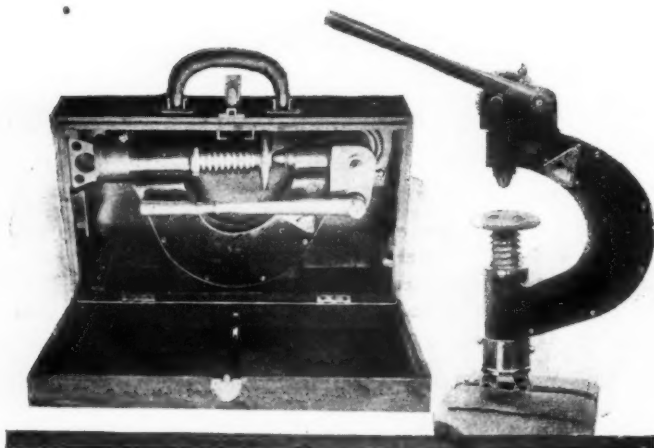


Fig. 1—Derihon portable machine for testing the hardness of metals

THE Derihon portable hardness testing machine is for testing the hardness of metals according to the Brinell method, that is, making an impression with a 10 millimeter ball under a pressure of 3,000 kilograms. The machine is the invention of C. Derihon and the factory in which it is made is at Loncin-lez-Liège, Belgium.

Fig. 1 shows the machine ready for the test with the lever raised and resting on the shaft. The piece to be tested is placed on the table of the machine, which is then raised until the piece is in contact with the ball. This done, the lever is pulled slowly over so as to give a progressive pressure, and the pressure is registered by a small manometer until 3,000 kilograms are applied. When this figure is reached the lever is slowly returned to its former position and the test is completed.

Under normal conditions it is usually sufficient to move the lever through an angle of 45 degrees to obtain the required pressure of 3,000 kilograms.

With each machine a small piece of steel is furnished in which a standard impression has been made, the size of the diameter being stamped on same. This standard piece is of BND steel, an air-hardened, chrome-nickel steel.

The construction of the machine is based on the principle of elasticity of the frame, which for this purpose has been given the shape of a horseshoe.

The pressure of 3,000 kilograms exerted does not at all change the resistance or elasticity of the frame, seeing that it is made of BND steel, having an elastic limit of 242,000 pounds per square inch, and that a pressure of 3,000, 4,000 or 5,000 kilograms does not work it above 10 kilograms per square millimeter or 14,423 pounds per square inch. Under these conditions repeated tests even in large numbers do not alter at all the calibration of the machine.

The deflection of the frame being relatively weak, 1 to 1.5 millimeters, a register, the construction of which resembles a metal manometer, is installed in the hollowed-out part of the frame.

To adjust the machine all that is necessary is to open the case inclosing the mechanism above the frame.

By means of a needle and a graduated dial, the deflection, and, therefore, the pressure exerted in making the test, can be quickly and easily read.

Portable Instrument Invented by Derihon Makes Impression with 10 mm. Ball Under 3,000 kgs. Pressure

Should the machine ever get out of adjustment, a comparison should be made on the standard piece, and when an impression of the same diameter has been made, the needle is brought over the figure 3,000 by means of a small adjusting screw. This adjustment, however, would only be necessary through some accidental cause, independent of the operation of the machine under normal usage.

This machine is placed on the market by H. A. Elliott, 507 Majestic building, Detroit, Mich.

How Marmon Springs Are Tested

EVERY spring, whether front or rear, used in the Marmon car is tested, the test being to put on the spring a load approximately the same as the weight the spring will have to carry when fitted in the car and the car carrying its rated passenger load. To do this, the spring is mounted on two miniature carriages on a beam resting on the scale platform. A screw block is brought upon the top of the spring, Fig. 2, and turned until the spring is deflected to a certain amount indicated by the gauge, this deflection being approximately the same as would be caused by the car with passengers. The total weight then exerted on the scale beam is taken, this approximating 1,300 pounds which, when 130 pounds, the weight of the spring and equipment, is subtracted, leaves 1,170 pounds as the pressure exerted on the spring to bring it to the necessary deflection. Should the spring vary more than 50 pounds in bringing it to this deflection, it is returned. Having all of the springs of uniform strength in this way assures an even body support.

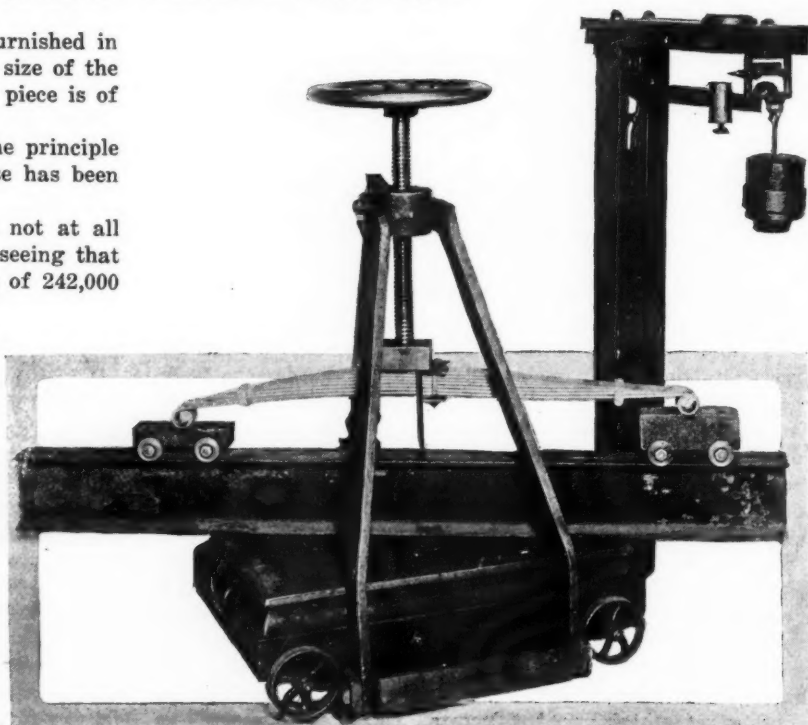


Fig. 2—Method of testing all springs used on Marmon cars for uniform strength

Development of the Modern Magneto

Electric Spark First Used for Ignition in 1804—Principles of High and Low Tension Magnetos

Paper read before the Institute of Automobile Engineers, London, England, by A. E. Bennett

It is somewhat difficult now to discover the real origin of electric ignition, but it is generally accepted that it was first used by a man named Le Bon in some experiments which he conducted as far back as the year 1801.

In the year 1804, it is known that two men named Barsanti and Matteucci used electric sparks for firing the charges in experimental engines which they constructed. Such an engine may be said to be the forerunner of the present-day gas engine.

The adaptation of electro ignition by means of spark plugs, more or less of the types that are known to us to-day, is attributable to an inventor by the name of Lenoir, whose principal experiments were carried out in 1860.

The actual inventor of the magneto which is said to have been a man by the name of Markus, born in Malchin in Mecklenburg, but in later years better known in Vienna. Markus is also credited with having been the inventor of the first gasoline automobile, which is said to have been built by him in the year 1875. The first vehicle produced by him is now in the possession of the Austrian Automobile Club.

The earliest ignition appliances used by Markus had dry batteries as a source of energy, but later he experimented with thermo-electric appliances as a source of energy. It was not until 1870 that he commenced experiments with magneto generators. These generators were of the low-tension type, and were equipped with oscillating armatures, the current for ignition purposes being utilized over mechanically-operated tappets.

Early Magneto Patents

Markus applied for patents in Germany for magneto electric ignition apparatus in 1883, and these were granted. It is also possible that patents were applied for at the same time in other countries, but this is of little importance.

In the year 1880, experiments in magneto ignition appliances were conducted by the Deutz Gas Engine Company. About the same period Siemens and Halske, of Berlin, constructed magneto generators for telephone purposes, but they do not appear to have made any attempt to apply their machines to ignition work.

Bosch Comes on Stage

Towards the end of the year 1887, Robert Bosch, Stuttgart, commenced the

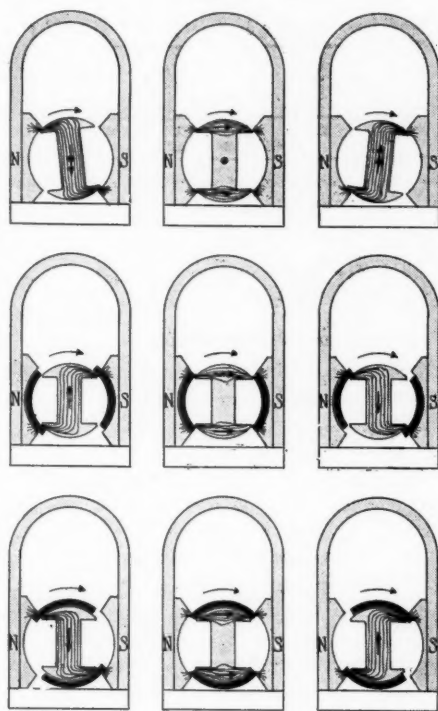


Fig. 1—Diagrams showing the relation between the path of the magnetic lines of force in a rotating-armature magneto and one of the oscillating-sleeve type

manufacture of ignition magnetos. These were constructed of flat horseshoe magnets of practically the same design as those used on his products to-day. The earliest types of magnetos were of the low tension variety, and had oscillating armatures controlled by strong spiral springs enclosed in brass tubes, the function of the spring being to restore the armature to a normal position after it had been deflected by the operation of a cam movement and released. At this time there had been no need to consider a rotary magneto, as the only demand for ignition appliances was for slow-running gas engines.

In June, 1897, patents were applied for by Bosch in all industrial countries for a magneto electric machine which had a stationary armature, the operation of the machine being effected by means of two soft iron segments mounted on phosphor bronze disks with steel spindles. These disks were caused to oscillate between the stationary wound armature and the magnetic pole-shoes, and as the wound armature was stationary it was possible to conduct the current away from the winding with-

out sliding contacts, brushes, and the like. Another important feature of this construction of machine was its ability to produce a greater number of electrical impulses than was possible with a machine fitted with a moving armature.

Rotating Magneto Introduced

In the years 1899 to 1901 the high-speed, single and multi-cylinder internal combustion engine was being rapidly developed, and in consequence of this, the oscillating type of magneto could not be used, and the sleeve method was adapted to rotating machines which were effectively used on multi-cylinder engines. The advantages of the rotating-sleeve machine were obvious, as they produced four electrical impulses per revolution of the sleeve, each impulse occurring at an angle of 90 degrees, and alternately changing its polarity.

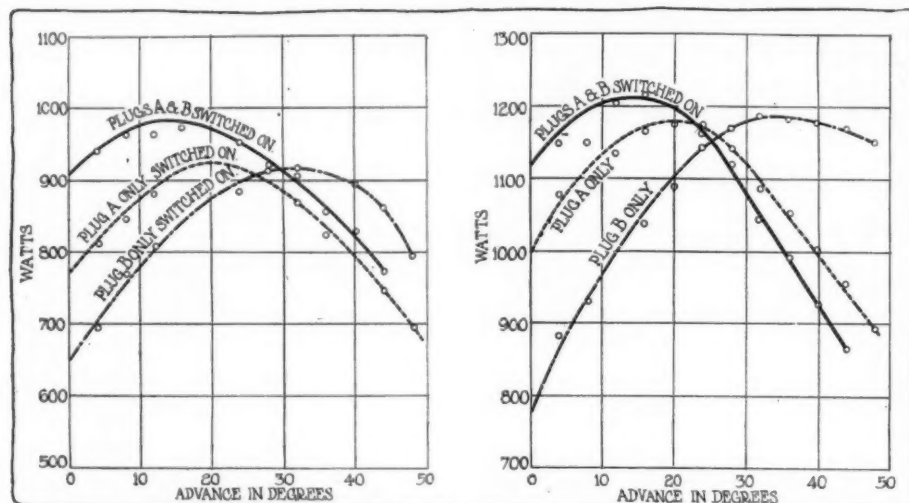
Fig. 1 illustrates the passage of the magnetic lines of force in a magneto machine fitted with a rotating armature, as compared with those in a machine equipped with a rotating sleeve and stationary winding, arrows indicating both the direction in which the machine rotates as well as the path of the magnetic lines.

The application of the above mentioned type of low-tension magneto necessitated the design of a make-and-break mechanism, by which the sparks could be produced in the combustion chamber, and a number of patents were taken out about that time.

High-Tension Magneto Patents

In the year 1900 Henry Thomas Dawson and Henry Alfred Dawson, Canterbury, England, applied for patents for a magneto ignition apparatus, in which a low-tension magneto was used in conjunction with an induction coil to produce a high tension current. There appears to be very little known about this invention, and it was probably only very little used.

In October, 1901, Ernst Eisemann, of Stuttgart, applied for a patent for a magneto apparatus, in which the armature was coupled to a contact disk running synchronously with it. By the rotation of the armature, the winding was alternately short-circuited. At each interruption of the short circuit, a current was allowed to flow through the armature winding to the primary winding of an induction coil. The current produced at the moment of the interruption augmented the current being generated in the winding of the armature,



Figs 2 and 3—Curves obtained from test of motor cycle engine fitted with two spark plugs for single or two-point ignition. The output of the engine is shown in watts produced by a direct-coupled generator

and flowed into the primary winding of the induction coil and set up an induced current in the secondary winding of the coil, which was capable of jumping the gaps between the electrodes of the sparking plug.

Bosch Double-Winding Patents

It was not until the year 1902 that Bosch applied for patents for what is to-day known as the arc light ignition, in which the separate induction coil is entirely dispensed with, and a high-tension current is produced in the armature winding direct. In this machine the armature consists of two windings, known as the primary and secondary, the primary consisting of a few turns of thick wire, the secondary consisting of many turns of thin wire and forming a direct continuation of the primary.

The outer end of the secondary winding is carried direct to the spark plug on the engine after having passed through the necessary distribution gear. For the purpose of this high-tension magneto, either form of current producer can be used—the rotating armature or the fixed armature and rotating sleeve—the only difference between the two being that an electrical impulse is produced for every 180 degrees of rotation of the machine with the rotating armature and every 90 degrees with the rotating sleeve and fixed winding. As the machine rotates with the contact breaker short-circuited, only a comparatively low-tension current is produced, but when the contact breaker is caused to open at the proper moment, a high induction effect is produced in the windings, and by this means the voltage increases sufficiently to produce a high-tension spark capable of jumping across the electrodes of the spark plug.

The above method of connecting the two windings causes the production of a spark which is of exceptionally high temperature, and which lives for an appreciable time, and perhaps this more than anything ac-

counts for the success of this type of magneto as an ignition appliance.

Magneto for V-Type Motor

It will be understood that as the various types of engines were developed, so it became necessary to produce different types of magnetos. For instance, the V-type engine presented considerable difficulty to the magneto manufacturer. This type of engine has its two connecting rods attached to a common crankpin, which means that the explosion impulses are produced at intervals of 360 degrees plus the angle between the cylinders in one case, and 360 degrees minus the angle of the cylinders in the other, while the magneto with normal armature and poleshoes can only give an electrical impulse every 180 degrees of rotation. The difficulties thus presented were overcome about the middle of 1905 by means of a magneto which had both its armature shuttle and its poleshoes shaped irregularly. The irregular

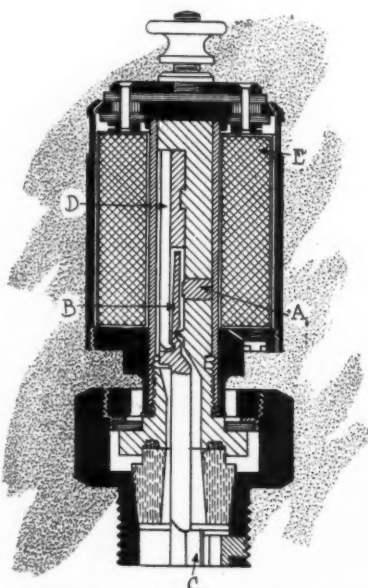


Fig. 4—Section through Honold magnetic plug in which the spark occurs across points separated by means of a solenoid

shaping of the poleshoes and armature core is now known as staggering, and by this means it is possible to produce electrical impulses at irregular intervals.

In a magneto of this type, the magnetic lines of force do not pass from one pole-shoe through the armature core to the other pole-shoe, as is the case with a normal magneto, but they are deflected axially, passed to the other side of the magnetic circuit and continue in a radial path.

The further development of the magneto has of necessity had to follow engine design. For instance, the introduction of the dual ignition marks a time when designers were increasing their engine dimensions. In addition to this, it may be said, as far as this country is concerned, that manufacturers and public alike were loth to abandon a supplementary form of ignition, and were of the opinion that the magneto could not be made sufficiently reliable to be trusted as the only means of igniting the charge.

In the early days of multi-cylinder engines, various forms of battery ignition apparatus were employed, and for a time a separate coil and trembler were considered necessary for each cylinder. Later, a single trembler was used in conjunction with a number of coils on multi-cylinder engines. Then followed what was known as the synchronised ignition, in which a single coil and trembler were used and a high-tension current was distributed by various forms of distribution gear, but it was not until the beginning of 1908 that the form of dual ignition apparatus so well known today was introduced. This is a form in which the battery ignition is controlled and distributed by means of the magneto, that is to say, the primary interrupter is carried on the armature shaft, and the high-tension current is distributed over the ordinary magneto distributor; thus, only one set of high-tension wires and one set of spark plugs have to be used.

Magnetic Plug Ignition

Many efforts were made to produce a magnetically-operated tappet mechanism to supersede the low-tension, make-and-break mechanism used in conjunction with the low-tension magneto, which gave such satisfaction that car manufacturers of the period were disinclined to give up its use. Probably the first man to conduct experiments with mechanically operated tappets was an engineer by the name of Seck, in Aachen, and there were a large number of others who conducted experiments in England, America, Belgium, France, etc., but comparatively little success attended their efforts.

After a number of years of experimenting, a magnetically-operated tappet, low-tension ignition gear, known as the Honold system, was put upon the market in 1907, but it was never taken up very extensively, chiefly because it was not easily adaptable to existing engines. In addition to this, by the time it was perfected, the self-con-

tained, high-tension magneto had shown its reliability to such an extent that it was adopted practically universally.

It is, however, interesting to study the manner in which the various difficulties in connection with the magnetically-operated tappets were overcome. These difficulties lay principally in the design and construction of the plug, which was required to be gas tight, to carry an electro magnet and its controlling springs, and a rocking armature which operated the tappet heads, and the problem of embodying all this in a very small compass was not easy of solution, especially when it is considered that the plug itself had to be made in cylindrical form so that it could be screwed in and out of the combustion chamber of the engine in the same way as the ordinary high-tension plug.

Operation of Magnetic Plug

In the Honold system the armature and its controlling spring are mounted on the lower portion of the plug, which also carries the soft iron members which form the electro magnets for operating the armature as shown in Fig. 4. The whole of the operating mechanism is screwed into a solenoid, and the soft iron core which actuates the tappet arm is divided at A, which is about the middle of the solenoid. The core being magnetically insulated, a north and south magnetic pole is produced at this point, and the armature B carrying the tappet arm is attracted, thus separating the contact points C, this separation taking place synchronously with the operation of the contact breaker on the magneto. The armature B is carried on a knife edge, and the tappet head is normally resting in a V-shaped block, so that by the pressure of the spring D, the circuit between the tappet heads is kept closed until the impulse of current is permitted to pass into the coil E, energize the electro magnet, attract the armature B and separate the points at C.

Another difficulty in connection with this type of ignition plug was that of producing a winding which could be well-protected against mechanical damage as well as capable of withstanding high temperatures.

The Magneto of Today

In spite of the many thousands of experiments that have been carried out in connection with ignition apparatus in many varying forms, the self-contained, high-tension magneto, as known to-day, has undoubtedly proved itself the most useful, and has for this reason been adopted almost universally.

Two-Point Systems

In this particular connection, the author refers to the very limited extent to which two-point ignition has been adopted. A good deal has been written on the subject, and the two-point system has been used here and there for racing engines, but the engine designer has never realized its full value. Perhaps the reason is that he has

not been willing to alter the design of his engine, or to construct an experimental engine, in order to prove whether the claims made by the magneto manufacturers could be substantiated.

It may, therefore, be interesting to study the results of some experiments with two point ignition which were conducted some time ago in the Bosch works. For the purposes of these experiments, he took a motorcycle engine 62 by 75 millimeters and coupled it to an electric generator in order to measure the output. The normal plug position was at B, Fig. 7, and a second plug was fitted in the cylinder head at A, immediately over the center of the piston for the purpose of experiment, both plugs being of the ordinary type. The magneto used for the purpose was one specially designed for two-point firing; the armature winding had been strengthened, and the two ends of the secondary wire were brought out to two high-tension terminals, which were directly connected to the spark plug terminals, so that the firing of the two plugs was absolutely synchronous.

Two-Point Ignition Tests

Figs. 2, 3 and 5 clearly indicate the results of the tests; the output of the elec-

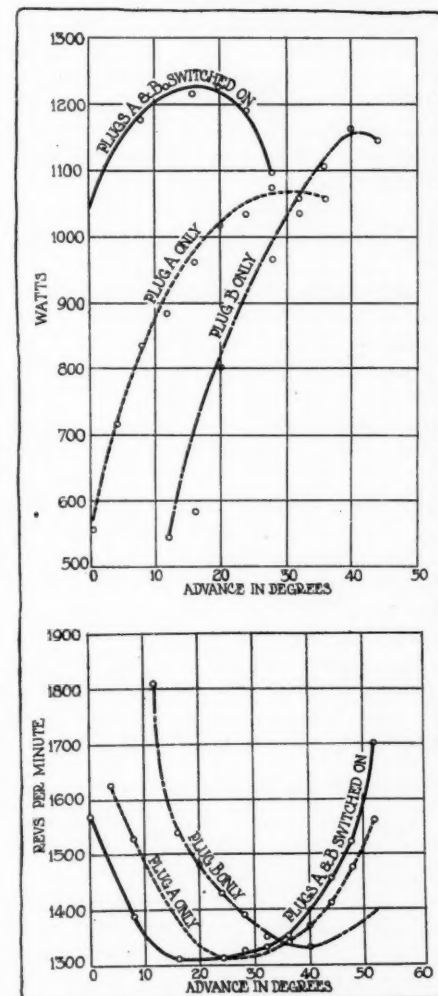


Fig. 5—Two-point Ignition tests showing results obtained with plugs sparking separately and together

Fig. 6—Continuation of same tests, but with engine working on constant load

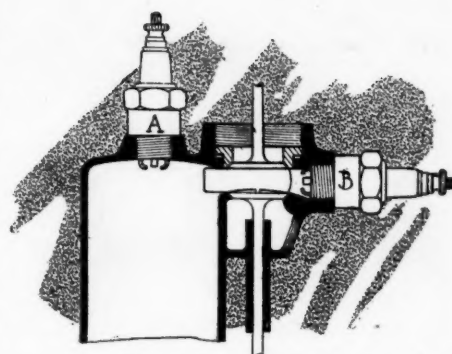


Fig. 7—Position of spark plugs in two-point ignition tests described

tric generator is given in watts, at speeds varying in the three tests from 1,500 to 2,500 r.p.m.; one curve shows the power produced when the plug at A is in operation, the second when plug B is in operation, and the third when plugs A and B are both in operation together. The figures at the bottom of the diagram show the advance of the ignition in degrees. It will be noted in Fig. 2 that at 1,500 r.p.m. with Plug A in operation, an output of 920 watts was obtainable with 21 degrees of advance, while with plug B only in operation, it was necessary to increase the advance to 32 degrees, and even then the output fell slightly below 920 watts. With both A and B plugs in operation, it is interesting to note that the output rises to 980 watts with only 15 degrees of advance.

In the test made with the engines running at 2,000 r.p.m., Fig. 3, under otherwise exactly similar conditions, with the engine working on plug A only, the output was 1,180 watts with 20 degrees of advance; with plug B only in operation, a slight increase in output was obtained, but an advance of 35 degrees was necessary to get the maximum power; with plugs A and B both working, the output reached 1,210 watts, while the advance requisite was reduced to 15 degrees.

When the engine was speeded up to 2,500 r.p.m., the results were somewhat different from the previous ones, but the difference only occurred when A and B plugs were working separately, Fig. 5. With plug A only working, an output of 1,060 watts was obtained with 30 degrees of advance, while with plug B only in operation, the output rose to 1,160 watts, but the ignition in this instance had to be advanced to 42 degrees. On again bringing the two plugs into action, the output rose to 1,230 watts, while the ignition was brought back to only 16 degrees of advance.

Tests With Constant Load

Figs. 6, 9 and 10 show the results of tests with the engine working on constant load, the revolutions being varied by the timing of the magneto only. In the first series, Fig. 6, the engine was set to give a constant output of 840 watts. With both plugs in operation this output was obtained with the ignition set at dead center,

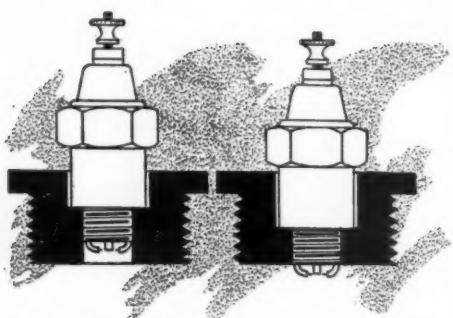


Fig. 8—Correct and incorrect locations of sparkplug in valve cap

whereas to obtain the same result with only one plug an advance of 5 degrees and 12 degrees respectively was necessary, and to obtain the lowest number of revolutions required a still greater advance.

In the second series, Fig. 9, the engine was set to give an output of 960 watts, and with both plugs in operation this result was obtained with about 2 degrees of advance, or 20 degrees at minimum revolutions. On the other hand, with plug B alone in operation, it required an advance of no less than 44 degrees to obtain the output with the minimum number of revolutions.

In the third series of tests, with both plugs in operation, an angle of advance of only 8 degrees was found to be sufficient to obtain the desired output of 1,140 watts, while, as shown in Fig. 10, by advancing the ignition to 24 degrees, the output could be obtained at 1,750 r.p.m. With the plugs working separately, the corresponding angles of advance were 30 degrees and 45 degrees respectively.

As the engine on which the above tests were carried out was only 62 by 75 mm., the results of the experiments are all the more interesting, and it has been proved by further tests conducted in connection with larger engines that a greater increase of power is obtainable, and particularly is this true with regard to engines which have combustion heads of large area.

It is, however, not merely a matter of putting a second spark plug into any convenient place in order to produce the improved effect. The experiments already carried out show that the results obtained vary very considerably according to the position of the plug.

Locating the Spark Plugs

The volume of gas in the combustion head to be fired requires a certain time, first of all to be ignited, then to complete the process of propagating the flame across the combustion chamber, and it is obvious that if the process of burning is started from the extreme outside of the combustion space, then the flame has a certain distance to travel which represents a lag which can be and has always been compensated for by advance firing. In order to reduce the time occupied in the propagation of the flame, it is necessary to place the spark plugs in such positions

that an equal volume of the gas is dealt with by each. For instance, in the case of a combustion chamber which is as nearly as possible circular, the plugs would best be placed equidistant between the center and the walls of the combustion chamber.

Not only is it important that the spark plugs should be placed in the correct position having regard to the diameter of the combustion chamber itself, but they should be placed the requisite depth into the combustion chamber, that is to say, they should be of such a length that the points across which the spark occurs are actually in the combustion chamber space. Fig. 8 shows two valve caps, one in which the plug is correctly placed, the other in which it is incorrectly placed.

Two-Point Ignition Desirable

Tests similar to the above have been carried out on four and six-cylinder engines, and in every case with markedly improved results, but unless engine designers take in hand the equipment of engines with two-point ignition in a thorough manner, the full advantages cannot be obtained, and if maximum engine efficiency is looked for, designers would do well to give their attention to this form of ignition.

The author has quite recently seen the results of some tests made with two-stroke motorcycle engines, and although he is not at liberty to mention the exact type and make of engine, he is able to assert that a most extraordinary improvement in the gasoline consumption was obtained by the introduction of a second spark plug working synchronously with the normal plug, the makers of the engine, in fact, claim an improvement of approximately 20 per cent in the gasoline consumption.

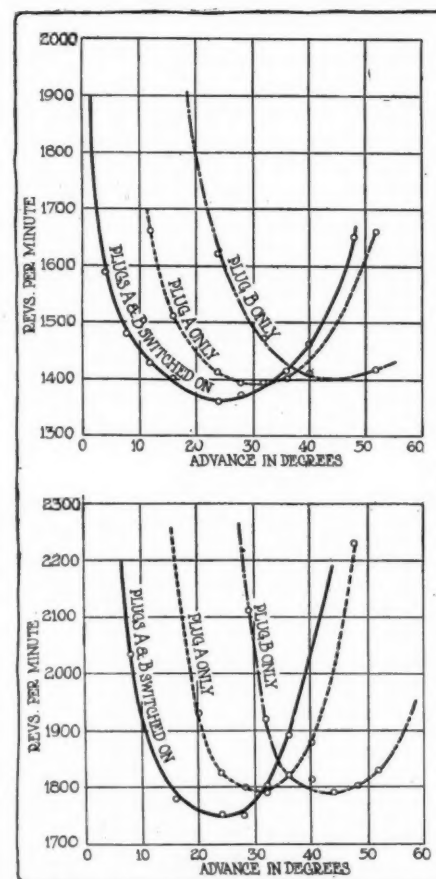
Just as valuable information might be obtained by the experiments suggested above, so might a great deal be done by the designer and the manufacturer conjointly to improve the equipment and installation of ignition apparatus on motor car engines, though it is probably true that the absolutely reliable working of the modern magneto is to some extent responsible for the tendency shown by designers to abandon efforts towards improved efficiency in this direction. The author believes that it is for this reason that engine manufacturers are encountering to-day a greater number of difficulties than they did a few years ago.

Delicacy of the Magneto

The magneto machine itself is undoubtedly an extremely delicate piece of mechanism, which in the earliest days of its introduction to the internal combustion engine manufacturer was wholly discredited because of its so-called delicate and complicated nature; yet to-day it is practically the only accepted means of ignition, and the fact that it is so is due not only to the persistence of the originators of magneto appliances, but also to the fact that they

realized when they commenced the exploitation of the magneto that unless a machine which was so small and which had to perform so important a duty was substantially and accurately made, the whole scheme would fail. Seeing that the magneto is probably manufactured to finer limits than any other part of the engine, and so would appear to call for very special care in fitting up, it is, perhaps, a little surprising that the installation and equipment of that part should to-day call for criticism. Yet it is so, and the author would specially call attention to the need for ample strength in, and accurate machining of, the bracket on which the magneto is supported, and even then some form of flexible coupling should be used for the drive. This coupling should not only be of such a form that it will compensate for any slight variation in the position of the magneto which might be brought about by differences of temperature, but it should also be capable of relieving the armature of shocks, and the author is of opinion that the most satisfactory coupling is the one shown in Fig. 12, in which the drive is taken through a laminated spring, the number and strength of the laminae being in accordance with the work required of it.

It is here interesting to note that in considering the strength of a coupling of this nature, not only has the amount of energy



Figs. 9 and 10—Single and two-point ignition tests. Curves showing the output under various conditions of speed and advance

required to rotate the armature of the magneto to be considered, but experience has shown clearly that by far the greatest strains are put upon the spindle by rapid deceleration of the engine, and particularly is this the case with the present-day, high-speed engines. More injuries undoubtedly occur to magnetos by reason of deceleration stresses than by acceleration stresses, and yet few designers have considered the question to be of sufficient importance to devote either much study or experimental work to it. Were greater care bestowed on the installation of the magneto, there would undoubtedly be fewer troubles.

Failure of High-Tension Cable

Having dealt with the installation of the magneto itself, we will refer briefly to its equipment, the cables and the means of supporting them, and the spark plugs, which are of hardly less importance than the fitting of the magneto itself. The cables used with a magneto are responsible for many of the troubles of the internal combustion engine, simply by reason of the fact that the people who manufacture them do not know the conditions under which they are to be used. The manufacturers of cable are naturally and, perhaps, excusably, under the impression that if they produce a cable which can carry a high-tension current, that is, a cable which has a specific insulation resistance, that is all that is required. This is a very mistaken idea, and the matter must be studied from an entirely different standpoint. It is not only a question of providing a cable that will see an engine through its test room period. It is just as important that the cable should remain reliable for a long period of time as it is that the magneto should do so, and therefore great care should be bestowed on the selection of the cable, as it is not a material that can be accepted at sight as being of good quality. It may, when purchased, be fully up to the manufacturer's specifications, but the time for the automobile manufacturer to study it is after it has been in use on an engine for a considerable time. A cable must be selected which retains its insulating qualities when put to the use for which it is intended.

Another point in which a mistake is often made should be emphasized. The thickness of the insulation is frequently increased with the idea of adding to the life of the cable. This, however, it does not do, but on the contrary it produces a detrimental effect. A cable of 7 mm. diameter, provided that the insulating material is of the requisite insulation resistance, is ample, but it must be borne in mind that the insulating material must be of such a character that it does not become impoverished with frequent rise and fall of temperature.

Metal Cable Tubes Bad

The method of supporting the cables is also a matter of great importance, and although a great deal has been said and written on this subject, even to-day high

tension cables are frequently to be seen carried in a metal tube. The author is convinced that if designers knew the extent to which this leads to trouble, they would undoubtedly abandon the use of metal tubes. Tubes, if they are used, should be made from an insulating material, but experience shows that the best results are obtainable if the method shown in Fig. 11 is adopted. Here it will be seen that it is a simple matter to hold the cables in position so that the insulation of one cable does not come in contact with the insulation of another. In addition to this, the condenser effect found to be produced with cable-carrying tubes is entirely done away with owing to the cables being supported by the fiber rings, and as they are not in a confined space they do not suffer so much from heat.

Against Quick-Detachable Terminals

Another small but important matter is the method of fitting terminals to the ends of high and low-tension wires, and many more or less elaborate terminal devices are now obtainable, though in most of them simplicity does not seem to have been aimed at. Until recently, the majority of manufacturers seemed to consider it necessary that high-tension connections should be quickly detachable, and for this reason often provided means by which the high-tension terminal could be detached from the spark plug while the engine was running. This practice is to be condemned, as it brings into operation the safety spark gap on the magneto which is designed only for use in an emergency, such as the breakage or shaking loose of a high tension connection. When it is required to cut out an individual cylinder of an engine that is running, it should be short-circuited, and no harm can possibly come to the magneto by so doing. It will therefore be found that the simple terminal device, Fig. 11, completely fulfils all requirements; not only does it make a good and substantial connection, but it has the advantage of being inexpensive, apart from the initial expense of the set of tools required.

Keep Spark Plug Cool

In spite of all the patents that have from time to time been taken out, the spark plug still provides its share of trouble, and will, no doubt, continue to do so as long as engine design continues to progress. Difficulty after difficulty crops up, particularly with the modern exceptionally high-speed engine. It is unfortunate for the manufacturer of spark plugs that so small an opening in the combustion head should have become the standard, as this is one of the principal reasons why the plugs give trouble. If it were possible to standardize a larger diameter of opening, insulation troubles would disappear, but even then there would still be left the difficulty of effectually conducting away the heat imparted to the plug points by the explosions, and a very serious difficulty with a gilled

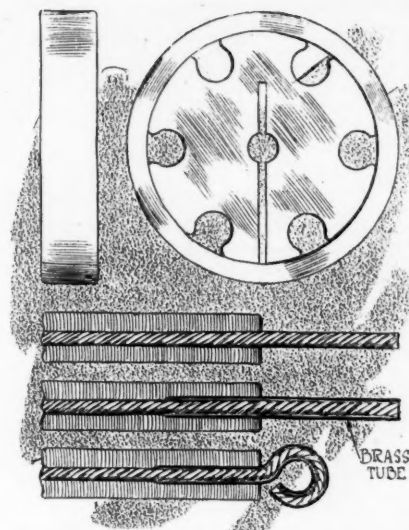


Fig. 11—Methods of carrying high-tension cables and of forming terminal loops with the use of brass tube

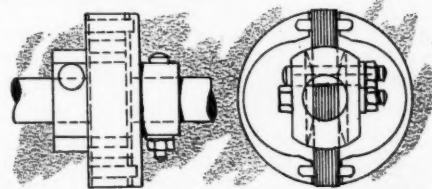


Fig. 12—Magneto coupling in which the drive is taken through a laminated steel spring

top, so that it can more readily radiate the heat.

It has been found by experiment that if the plug can be kept sufficiently cool, its life, from the point of view of insulation and also of wear, is considerably lengthened, but the very fact that the center electrode of a plug has to be carried in an effectual electrical insulator magnifies the difficulty of conducting the heat away from it.

Many efforts have been made and the difficulty has been overcome by one of the big continental firms. In manufacturing spark plugs, it is necessary to use a material for the sparking points which has the ability to resist the disintegrating effect of the electrical discharges, but unfortunately the alloy which has been found the most satisfactory in this direction is not a good conductor of heat. In the plug in question, the center electrode is therefore made in two pieces, a thin nickel alloy stem which projects into the combustion head and a heavy iron stem into which it is fastened so that as much heat as possible is radiated off. The return electrodes are knife edged.

Plug for High-Speed Engines

In order to further emphasize the difficulties, it may be mentioned that a spark plug has been specially designed for racing or exceptionally high-speed engines, in which the return electrode is so placed across the nose of the plug that the two ends are bedded into the barrel of the plug itself, while the center electrode is equipped

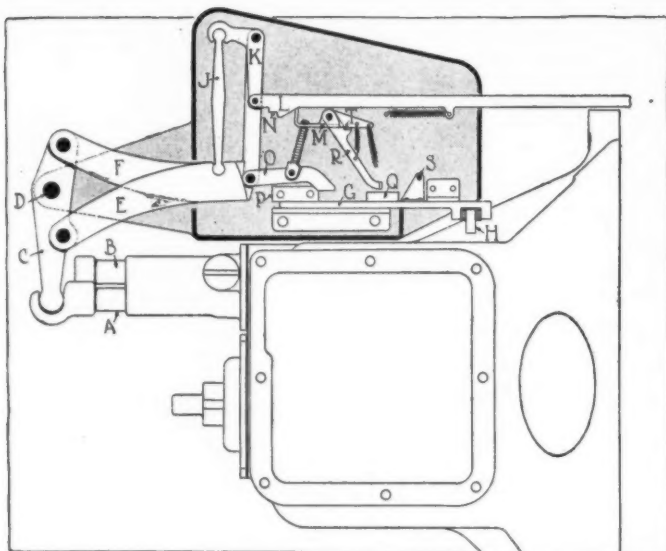


Fig. 1—Grand Rapids pedal gearshifter. The letters A, B, C, D, E, F, G, and H represent the parts used in engaging the gears, while the selector mechanism is indicated by the letters J, K, L, and M. The gear previously meshed is brought to neutral by the members O, P, Q, and G. The letters from L to T, inclusive, show the parts that are used in releasing the selector button

New Grand Rapids Gearshift Worked by Clutch

Operated by Buttons on Wheel—Can Be Attached to Any Car—Weighs 10 Pounds—Gears Selected in Advance

A MECHANICAL gearshift operated by the outward movement of the clutch pedal, and in which gears are selected by buttons on the steering wheel, has been brought out by the Grand Rapids Showcase Co., Grand Rapids, Mich. This differs from the mechanical gearshifter, made by this concern, in which power for shifting is obtained from the engine. This was described in the February 12 issue of THE AUTOMOBILE.

The new device, Fig. 1, is attached to the side of the gear-box, weighs 10 pounds and can be just as readily installed on an old car as on a new one. The design of the mechanism is such that a gear can be selected at any time previous to the shift and if after depressing a button, the operator changes his mind, the first button is thrown out by pushing another one. The illustration shows a three-speed gearshifter, but one for four-speeds can be made when desired.

The Mechanism Is Divided into Three Parts

In describing this gearshifter, for the sake of clearness, it is well to divide the description into three parts: the motion of the mechanism to mesh a gear; the movement of the different parts to bring the gear previously in engagement back to neutral; and the method of releasing the depressed button.

The mechanism actually used in meshing a gear consists of the parts designated by the letters A, B, C, D, E, F, G and H, the latter being the roller on the clutch pedal arm by which the motion is transmitted to the shifting mechanism.

The gears are actually shifted by the left or right movement of one of the rods A or B that extend from the left

end of the gearbox. These rods are actuated by the gear-shift arms C which are pivoted at D. These arms are situated one below the other and therefore only one can be seen. To each of these arms C are attached two fingers E and F. When a gear is selected one of these is lowered by the depression of one of the selector buttons so that the rod G, which is attached to the clutch pedal, as it moves to the left comes in contact with the finger E or F, depending on which is lowered, and forces this member to the left thus causing the movement of one of the rods A or B to the right or the left and consequently the meshing of the gear.

Four Sets of Selectors Used

The selector mechanism by which any particular arm is lowered is designated by the letters J, K, L and M, and there are four of these nested one above the other. By the depression of a button on the wheel, the selector rod L is drawn to the left, thus rotating the bell-crank K, and lowering J and the finger attached to it. The selector mechanism remains in this position until the shift is accomplished even though the pressure is removed from the button because the shoulder N on the rod L is caught by the hook on the left of the member M. As will be explained later, when the new gear is in position, the hook on the member M is raised thus allowing the shifting mechanism to fly back into position, impelled by the spring attached to it.

How Gear Is Brought to Neutral

Now that the meshing of the selected gear is understood, the bringing of the gear previously meshed back to neutral, will be explained. The parts that are used for this purpose are indicated by the letters O, P, and Q, the latter being a block riveted to the rod G. Now supposing that some gear is in mesh, and that consequently the rod A is moved to the left, then the finger E will also be moved to the left and the finger F will be moved to the right. The movement of the latter will result in the neutralizer O being pushed to the right and out of contact with the cam P. It is thus placed in the path of the block Q so that when the clutch is pushed out to accomplish the shift the movement of the rod G and the block Q to the left first brings the gear in mesh to neutral by forcing the neutralizer O and contacting finger F (in this case) to the left. When neutral is reached the neutralizer slides up on the cam P and out of engagement with the block Q, and the rod G is then free to continue to the left and engage the new gear.

Method of Releasing Buttons

All that remains now is to explain the method by which the selector button that is depressed is brought back to its normal position again, in other words, when one of the rods L is held to the right by the hook M how it is automatically released. This is done by the arm R and the pin S, which is carried on an extension of the rod G. The arm R is pinned to the member M as indicated and also rests on the shoulder T so that by rotating R to the right it will tip up M and release the rod L. Moving the arm R to the left has no effect whatever on M. The arm R is actuated by the pin S. When the pin moves to the left it catches the arm R whose end is in line with it because the hook L is now in contact with the shoulder N. The pin keeps on traveling to the left until the arm R slips out of contact with it. On the return stroke, the pin bends the arm R, to the right, releasing the member M and the rod L as already described.

If a button has been depressed for a certain speed and it becomes expedient to choose a different one the button first chosen is automatically thrown out by pressing the button wanted. This is simply accomplished. The hook on the member M spans all four rods L, therefore when a new gear is selected the hook is raised off of the shoulder of the rod

associated with the gear previously selected and thus the rod flies back to its normal position.

This gearshifter does not interfere with the clutch action in any way. When the clutch is disengaged without changing a gear, the rod G merely slides back and forth without actuating the shifter mechanism.

New Gearset Designed to Give Maximum Accessibility

Invention of H. G. Farr, of the Knox Automobile Co.—Gears and Bearings Can Be Removed as Unit

HERMAN G. FARR, of the Knox Automobile Co., Springfield, Mass., has invented a transmission gearing which has been designed to be readily accessible in case of repairs. The object of the invention is to provide a casing for the gearset parts in which the gearing may be removed from the casing as a unit. It is so designed that when the gearing is removed from the casing it will still be mounted in bearings in proper relation so that the gearing can be operated as well after it has been removed from the casing as if it were in the car itself. The design is said to improve on present practice in that the entire gearset may be removed in one operation whereas at present it is necessary to take down the different parts separately.

Single Casting for Gearset and Differential

To accomplish this object a single casing has been designed in which the gearset and differential are mounted. All the shafts in the gearset are each carried on two suitable bearings in two head members between which is carried a cage-like supporting frame. Since all the bearings are carried in the two head pieces of this framework, the casing is so constructed that the entire assembly may be removed without disturbing the bearings. It is possible then for a repairman to put the whole assembly on his bench and operate the gears in the same manner as if they were still in the car.

Referring to Figs. 1 and 2, three views of the assembly are given. Fig. 1 is a plan view of the entire gear showing the differential, shift rod and shafting all in position in the lower half of the casing. Fig. 2 shows the section on the line AB of Fig. 1 and also a cross-sectional view taken through the casing and gearset parts on the line CD of Fig. 1.

Referring to Fig. 1, it will be noted that the lower half of the casing containing the gearset is extended and forms a support for the two differential bearings. The gearshifting rods E and F are operated through supporting members G

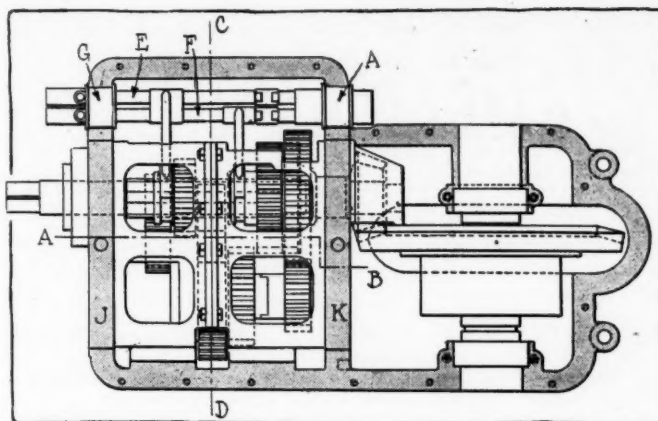


Fig. 1—Plan view of entire gear, including differential

and H which are provided with bearing surfaces in the lower half of the gearset housing. These shifting rods carry fingers which extend at right angles and engage with the clutches on the gearshaft, thus performing the gearshifting functions whenever the levers are moved.

The two head members which carry the bearing for the gearset shafts are shown at J and K. They are circular in form and fitted to the casing, being held in place by bolts to the side members. Between the head members there is a connecting frame L which is lightened by openings at various points which permit the gears to extend through them.

The entire frame construction is made in two parts which are connected by the flanges M bolted together. When it is desired to take the gearset mechanism out of the casing, when it is in the position shown in Fig. 1, it is only necessary to remove the top half of the gear casing, then to lift vertically the supporting members G and H, thus freeing them from the casing and then to pull the entire assembly horizontally to remove it from the right angled fingers which engage with the clutches on the sliding gears. If the fastening devices for the gear members J and K are loosened, the entire transmission unit can be lifted from the casing and placed wherever desired.

None of the transmission gearing parts are disturbed in their relationship to one another when lifted clear, and a workman will be able to make any repairs he desires and at the same time note the operation of these gears to much greater advantage than if they were in the car itself.

High-Speed Steel Reduces Tool Scrap

The growing use of high-speed steel, which might also be referred to as high-cost steel, is having its effect on the disposition of tool scrap in many places. The amount of the scrap is larger in proportion to the first cost than might be supposed; an automobile company which has kept close account of this finds it to be about 40 per cent. of the original amount purchased, or \$2000 on an original purchase of \$5000. As with most users of large and heavy cutting tools the entire tool is made of the high-speed steel, forged out in the same way as the old carbon tool. Where the tool holder and the cutting point are used, the amount invested in the high-speed steel itself is considerably less. The practice of this company is to have the scrap sorted and classified as to grade, this being accomplished by the markings on the tool shank. When a sufficient quantity has accumulated, it goes to the blacksmith shop and is worked over under a 1200 pound hammer by an experienced steel worker. In this way something over 80 per cent. of the scrap is successful reclaimed at a cost of about 5 cents per pound. In other shops, where high-speed drills and reamers are used extensively, they are reclaimed in a similar way, being drawn out into the proper sizes and shapes for lathe tools and similar work.

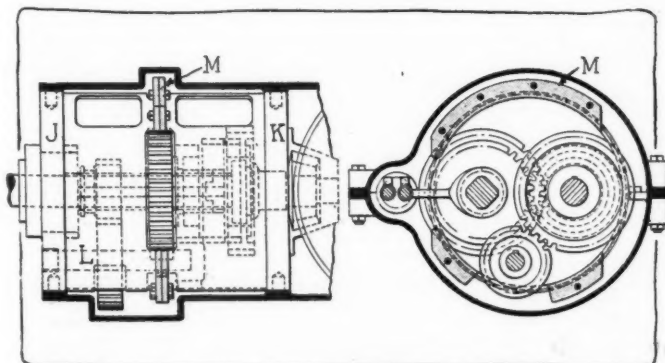
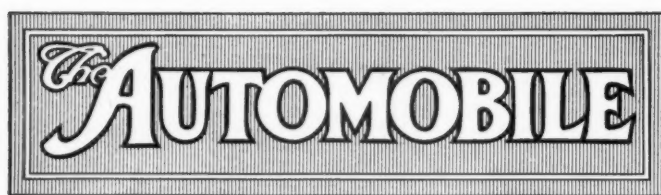


Fig. 2—Left—Longitudinal section on line AB, Fig. 1. Right—Cross section on C D, Fig. 1



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Organization Genius

RECENTLY a well-known automobile factory in Detroit was moved from its old quarters to an up-to-the-minute structure in another part of the city—a distance of 2 miles, the entire transfer being accomplished without a single car being held up in production by the change.

Several months before the actual move took place the big plant was laying its plans for it so that when the new plant was ready each department was given certain dates within which it was to move. It speeded up its work at that time and got far enough ahead so that it could spend several days in transferring its parts and machinery and get settled in its new quarters before the other departments were ready for its particular elements of the finished product.

The factory was operating at the time of the change on a schedule of about one thousand cars a month and delay in production of even one car meant a loss. This is a big object lesson for the industry. Every manufacturer is striving to attain the highest possible efficiency within the four walls of his plant. He is endeavoring to reduce manufacturing cost to its minimum; to so systematize his work that each man and each department will produce in the best possible manner. Delays in production mean much to all.

The thousand-cars-a-month plant is to-day running as smoothly in its new quarters as if it had always been there. This is to be expected from an

organized factory which could surmount the much bigger difficulty of actually pulling up stakes, so to speak, and settling down again 2 miles away without a hitch. The public has confidence in a concern and in that concern's product when it can so efficiently conduct its affairs. This public feels that the substantial qualities of the organization back of such a product must be reflected in that product.

The thousand-a-month plant and all other successes do not depend upon the ability of one man, but upon the combined acumen of several. True, a real genius may be the nucleus, but a part of that genius is in the ability to surround itself with men who are capable of adding their ability to its own.

Removing the Lid

THE organization of the Kardo Co., for controlling certain patents on rear axle construction looks very much like a burning brand thrown into the hoped-for smouldering faggots of patent litigation, which stirred the motor industry in America so persistently until a year ago. It was hoped that our industry would have peace, particularly from apparently needless patent litigation, and that the present Patents Holding Co., an organization in connection with the National Automobile Chamber of Commerce, would largely regulate the patent field. It was expected that the various makers would pool their patent interests in this company, thereby preventing widespread litigation among companies and disturbing public sentiment in general.

The organization of the present company seems diametrically opposed to this movement of peace in patent interests. It augurs future troubles. Our companies have been taking out patents very generally on their automobile construction; many of these patents have not been issued to date but are being carried along in the patent office. The unfortunate aspect of the present situation, in view of this general taking out of patents by other concerns, is that a score or more of our companies can bring out their heretofore hidden patents and so launch the entire industry into a maelstrom of patent litigation at a time when concerted efforts for peace are most required.

Agricultural Efficiency

THE possibility of what the future automobile buying ability of the agricultural class in America may be under economic development is but vaguely indicated in the last report of the Secretary of Agriculture in which it is stated that "Less than 40 per cent. of the land is reasonably well cultivated, and less than 12 per cent. is yielding fairly full returns, or returns considerably above the average."

If our farms are at such a low efficiency ebb, in other words, with less than one-eighth of the land yielding fairly full returns, what buying ability will our farming community have when the other seven-eighths are brought up to this standard? This alone should set at rest the misgivings of some manufacturers who are wondering where the automobiles built during the next few years will find a market.

Kardo Co. Bases Hopes on Eight Patents

A Review of the Claims Made by the Company—Patents Which It Controls Have Important Bearing on the Industry

NEW YORK CITY, March 17—As announced last week in THE AUTOMOBILE, the Kardo company has incorporated in Ohio for \$1,000,000 to form a holding company for eight important patents which deal chiefly with rear axle and gearset construction. These patents are eight in number and are as follows:

No. 608,017, dated July 26, 1898, to W. C. Baker, on an anti-friction bearing for use in a front axle; 664,478, December 25, 1900, Hopewell patents rear axle on removable pinion mounting; 705,304, July 22, 1902, Sangster patent of Packard company, which covers broadly adjustment of bevel gears; 783,168, February 21, 1905, Baker rear axle patent; 792,690, June 20, 1905, on bevel gear drive and compensating mechanism; 950,191, February 22, 1910, on adjustment bevel gearing—this is an improvement on the Sangster patent; 1,013,450, January 1, 1912 on rear axle transmission and, also, the re-issue—12,966—June 1, 1909, on power transmission mechanism for automobiles, which covers the Peerless rear axle with universal joints and removable features.

Patent No. 664,478, while taken out as early as 1898, represents some important claims. As the patent letters state, it is adapted to vehicles which are subject to jolts and jars while in operation, and which are affected in their running by them. The object in this patent is to provide a means for compensating in the drive for the rising and falling of the rear axle as the wheels pass over the obstruction.

A diagrammatic illustration of the points covered in this patent is given in Fig. 1, the principal point of interest being the telescopic shaft which permits a lengthening and shortening of the drive to compensate for irregularities in the highway. There are six claims to this patent, the first of which calls for a motor driven vehicle having a primary shaft driven by the motor and an axle having a gear fast thereon, a casing surrounding the bevel drive is also called for and, "a telescopic shaft jointed respectively to the stud shaft and primary shaft." The stud shaft carries the driving pinion at its end.

Claim two of this patent calls for a casing having a removable cap which will render accessible the bevel gear driving members. Claims 3, 4 and 5 dwell on the combination of the motor clutch telescopic shaft and bevel gear driving shaft while claim 6 broadly brings in, "said driving connection including a shaft shiftably mounted relatively to the body and the axle." In this car the body was adapted to carrying the motor.

Claims of Sangster Patent

Patent No. 705,304 taken out by C. T. B. Sangster, a British subject of Birmingham, is assigned to the Packard company and has nine claims broadly dealing with more accessible, dust-tight casing for running gear, gearset clutch and rear axle and a gearset so arranged that three speeds forward will be provided together with a locking arrangement which prevents accidental reverse. This patent has subsequently been improved on the last, being the Sangster patent No. 950,191 taken out February 22, 1910. This patent deals particularly with positive and safe gear shifting mechanism. The last Sangster patent has eleven claims, claim 4 mentioning a gear shift locking device consisting of a slidable rod, a device for holding said rod yieldably in position and a device for locking the rod in position. Claim 7 of this patent calls for a spring latch to hold this rod. The object of the rod is to lock the gears in place so there will be no chance of inadvertently slipping into reverse gear or otherwise mishandling the gears.

Patent No. 783,168 taken out by Walter Baker, Cleveland, Ohio, includes 14 claims dealing with improvements on the rear axle. This patent covers a differential casing of a diagonally split casing which permits the cap to be removed so that the differential gearing can be inspected. Claim 2 of this patent covers means for holding two axle sleeve housings and claim 3 covers the external semi-cylindrical hubs. The axles covered in the patent are of the floating type with the wheel bearing on the exterior of the casing. In order to

hold the two shafts together so that there will be no danger of them separating, the patent requires that one of the axles be hollow and that a rod passing through the hollow axle shall engage with the other. This forms a tie rod which holds the construction of the rear drive together. The patent also provides for a thrust bearing on the tie rod and for means of adjustment of the bearings on the rear axle. In the patent the cup and cone bearing is especially mentioned.

Patent No. 792,690 has 24 claims which deal particularly with improvements in the mounting of the differential. This patent was issued June 20, 1905. Patent No. 1,013,450, issued to Chas. Schmidt, is an improvement on the previous Sangster patent and is assigned to the Packard company being now employed in a gearset design. The locking mechanism is continued but the assembly simplified.

No Local Speed Laws for Montana

HELENA, MONT., March 14—In Montana the cities and towns are forbidden to regulate the speed of automobiles within the city limits, under the operation of the law providing for registration of motor vehicles, passed at the recent session of the legislative assembly. The law definitely takes away from local authorities the power to fix speed limits, and instead fixes the following state-wide rule:

"No person shall operate a motor vehicle on the public roads or highways of this state at a rate of speed greater than is reasonable or proper, having regard to width, traffic, and the use of the highway and the general and usual rules of the road, or so as to endanger property or the life or limb of any person."

PHOENIX, ARIZ., March 14—Wayland Wood, the Phoenix automobile agent who has been leading the fight against the Arizona automobile registration law, states that he will not bring a proposed action, as a result of the upholding by the supreme court of California of the California law, which was the model for the Arizona statute. It is claimed by Arizona automobile owners that the law imposes a double taxation, as the machines are already taxed as personal property. Automobile owners are paying license fees under protest.

MILWAUKEE, WIS., March 11—Rollins W. Hutchinson has become the general sales and advertising manager of the Sternberg Manufacturing Co., of Milwaukee.

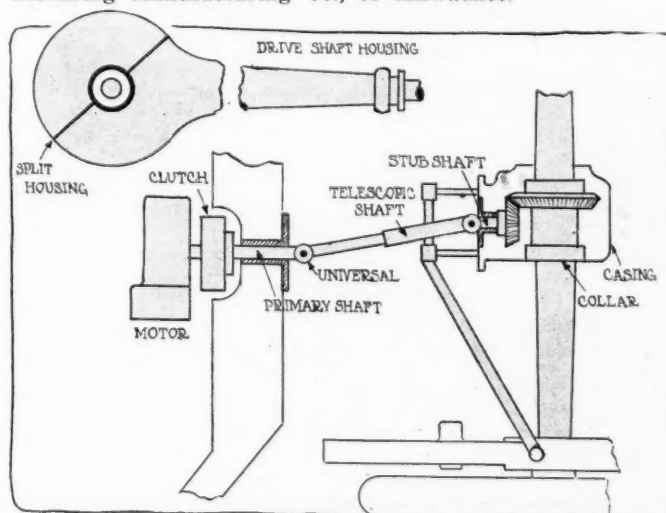


Fig. 1—Diagrammatic illustration of two claims of the Kardo patents. The upper view shows a diagonally split differential housing, the lower a drive shaft with telescopic joint

French Exports Grow \$43,893,797 in 1913

United States and Great Britain Buy Fewer Cars But Sell More to Tri-Color Republic

PARIS, FRANCE, March 12—The year 1913 was a favorable one in the automobile trade of France with foreign countries, both imports and exports showing a material increase. There was a general increase in imports from all the principal countries, but exports to the United States, Belgium and Great Britain fell off, although those to all other countries showed increases, and there was a total increase of \$2,398,797. Exports to Germany and Russia especially gained, being nearly \$1,000,000 more in the case of each of these countries than in 1912. Great Britain, Belgium and Germany, however, are to a great extent distributing nations and changes in their trade are therefore of comparatively small significance. The exports to the principal countries were as follows:

EXPORTS TO	VALUE.	EXPORTS TO	VALUE.
Great Britain	\$10,671,768	Russia	\$1,263,764
Belgium	7,896,402	Italy	1,125,769
Algeria	4,403,102	Switzerland	920,801
Germany	3,978,888	United States	614,319
Argentina	3,323,653	All other countries..	7,148,797
Brazil	1,229,679		
Spain	1,316,839	Total	\$43,893,797

The imports into France in 1913 amounted to about \$3,860,000, not including those to Morocco, Algeria, and other protectorates and possessions. Great Britain led in the trade, sending \$1,220,655 worth of cars; the United States was second with \$1,096,859, and the other principal countries sharing in the trade were Germany, \$529,241; Belgium, \$441,970, and Italy, \$323,854.

Ford Can Fix Minimum Price in England

LONDON, March 16—The Ford Motor Co. has won a suit against J. Armstrong, Piccadilly automobile agent, for \$6,250 for selling its cars for less than \$750 to the British automobile owners' combination.

This establishes the right of the Ford company to fix a minimum price for which its automobiles may be sold in this country.

The Ford car sales system in England was outlined by counsel, who explained that the country was divided into 1,000 districts for purposes of distribution, each agent receiving exclusive privileges for dealing in Ford cars in his particular territory. If, it was added, cars were sold at less than the list prices, the company would be seriously damaged.

Liability Law Held Valid

INDIANAPOLIS, IND., March 16—An opinion has been handed down by the Indiana supreme court to the effect that the employers' liability law of 1911 is constitutional and valid. The law does away with the fellow-servant rule as a defense where there are more than five employees. It also does away with the doctrine of contributory negligence in some cases. Manufacturers throughout the state were deeply interested in the outcome of the case which has now been finally decided.

Delling Is Mercer Engineer

TRENTON, N. J., March 17—E. H. Delling has been appointed chief engineer and designer of the Mercer Automobile Co., in place of Finley R. Porter, resigned. Mr. Delling was connected with this concern about 2 years ago in the capacity of assistant engineer. He is the builder of the Delta car, which was seen to good advantage in the 1913 Elgin races.

Klaxon Gets Permanent Sparton Injunctions

NEW YORK CITY, March 17—Judge Hough has entered a final decree in the U. S. District Court, in which he gives the Klaxon company a permanent injunction against the Jack-

son Eastern Distributor, Inc., the Garland Auto Co., and the Haynes Auto Co., dealers and users of Sparton horns. But he gives them the privilege of a secession of this injunction for 3 months by the payment of \$2,000 to the Klaxon company. This offer is open until March 25, and if these companies take advantage of this, they may go ahead unrestricted in their sale or use of the infringing Sparton horn until June 30.

This privilege was given the defendants on account of the pending appeal in Judge Chatfield's Court in Brooklyn. The Court saw that if the Newton people should win, an injustice would have been done to these Sparton people by enjoining them, so they were given a 90-day privilege by the payment of \$2,000 for the right to use the Sparton horn.

The injunction against the A. Elliott Ranney Co. still stands. On February 20, Judge Ward granted a prelim-

Automobile Securities Quotations

There was an advancing tendency in last week's securities quotations. The trading was a little active, but largely professional. United States Rubber common was heavy, having a bid of 61, a gain of 1 point over last week's quotations. This was partly due to the statement made on Monday that a \$10,000,000 note issue was proposed, but had to be postponed on account of unfavorable conditions in the market for such issues. Maxwell Motor issues were strong last week, the common gaining a point, the first preferred, 7 points and the second preferred, 3 points. For the first time in months, General Motors experienced a drop in its stocks. The common came down 4 points while the preferred dropped 1-2 point. This seems to be an appropriate time for a person who can afford to tie up his money for some time without return thereon, to get hold of an attractive speculation in this General Motors common stock. Goodyear common dropped again this week, this time 5 points, due to the recent \$4,000,000 sale of its common and preferred stocks. Vacuum Oil rose 11 points. There were a few other fractional gains and losses, due to light business. Brokers reported that it was easier to sell stocks than to buy them.

	Bid	Asked	Bid	Asked
	1913	1913	1914	1914
Ajax-Grieb Rubber Co., com.....	150	165	200	..
Ajax-Grieb Rubber Co., pfd.....	95	100	99	102
Aluminum Castings, pfd.....	97	101	98	100
Chalmers Motor Co., com.....	115	125	80	84
Chalmers Motor Co., pfd.....	100	102	92	94
Firestone Tire & Rubber Co., com.....	270	280	284	290
Firestone Tire & Rubber Co., pfd.....	104	107	108½	110
Garford Co., pfd.....	95	100	80	90
General Motors Co., com.....	29	31½	74½	76½
General Motors Co., pfd.....	76	78	92	93
B. F. Goodrich Co., com.....	27½	28½	22½	23½
B. F. Goodrich Co., pfd.....	93	97½	86	90
Goodyear Tire & Rubber Co., com.....	345	355	150	160
Goodyear Tire & Rubber Co., pfd.....	101½	103	93	95
Gray & Davis Co., pfd.....	..	..	90	97
Hayes Manufacturing Co.....	..	90	..	..
International Motor Co., com.....	5	10	..	5
International Motor Co., pfd.....	35	45	..	15
Kelly-Springfield Tire Co., com.....	15	20	57	58
Kelly-Springfield Tire Co., pfd.....	79	136	140	..
Kelly-Springfield Motor Truck Co., com.....	..	..	..	..
Kelly-Springfield Motor Truck Co., pfd.....	..	..	..	..
Lozier Motor Co., com.....	..	..	13	16
Lozier Motor Co., pfd.....	..	..	..	65
Maxwell Motor Co., com.....	..	..	6½	7
Maxwell Motor Co., 1st pfd.....	..	..	34	35
Maxwell Motor Co., 2d pfd.....	..	..	12	13
Miller Rubber Co.....	175	185	128	133
New Departure Mfg. Co., com.....	..	..	118	123
New Departure Mfg. Co., pfd.....	..	..	105	107
Packard Motor Co., com.....	..	..	101	116
Packard Motor Co., pfd.....	..	..	95	98
Palmer & Singer, pfd.....	..	..	..	..
Peerless Motor Co., com.....	..	..	20	30
Peerless Motor Co., pfd.....	..	..	..	80
Pope Manufacturing Co., com.....	20	22	1	3
Pope Manufacturing Co., pfd.....	..	65	11	15
Portage Rubber Co., com.....	..	..	..	35
Portage Rubber Co., pfd.....	..	..	..	90
Reo Motor Truck Co.....	11½	12½	8	8½
Reo Motor Car Co.....	20	21½	18½	19½
Rubber Goods Mfg. Co., pfd.....	103	106	105	110
Russell Motor Co., com.....	..	..	..	..
Russell Motor Co., pfd.....	..	..	..	..
Splitdorf Electric Co., pfd.....	..	..	40	50
Stewart-Warner Speedometer Co., com.....	..	..	56	57
Stewart-Warner Speedometer Co., pfd.....	..	..	100	101
Studebaker Co., com.....	29	30	29	30
Studebaker Co., pfd.....	86½	90	82½	85
Swineheart Tire Co.....	88	95	69½	70½
U. S. Rubber Co., com.....	..	..	62	62½
U. S. Rubber Co., 1st pfd.....	..	33	102½	103½
Vacuum Oil Co.....	..	..	225	227
White Company, pfd.....	103	108	107	110
Willys-Overland Co., com.....	62	64	66	68
Willys-Overland Co., pfd.....	92	97	94	98

*No market.

†The par value of these stocks is \$10.00; all others \$100.00.

inary injunction to the Klaxon against the Ranney Co., preventing the delivery of Hudson cars fitted with Sparton hand-operated horns. Judge Hough now states that this injunction will stand until the Newton appeal is decided.

Chain Patent Case to Cincinnati

CINCINNATI, O., March 14—A transcript was filed in the United States Circuit Court of Appeals at Cincinnati in the case of Arthur S. Perry and Milton H. Perry, known as the Perry Chain Grip company and Motor Specialty company against the Weed Chain Tire Grip company. The case comes from the Michigan Federal court and is a suit for infringement of patent brought by the Weed company against the Perrys. The patent involved is the Parsons patent covering improvements in armor for pneumatic tires in the form of a chain tire grip.

Accessory Assn. To Control Show Exhibits

NEW YORK CITY, March 16—The powers of the Motor and Accessory Assn. will be even greater in the future than in the past as far as the regulation of local exhibits is concerned. At the meeting of the National Automobile Chamber of Commerce, held a week ago, it was voted that in matters relative to the exhibits of accessories, the National Chamber will recognize the ruling of the accessory organization. This means that next year it will be within the power of the accessory organization to indirectly control accessory exhibits in the local shows, in that any accessory maker exhibiting at an unsanctioned local show is not eligible to exhibit at the national shows at Chicago or New York. The penalty will be disbarment from big shows for 18 months.

Extra Batavia Rubber Common Dividend

BATAVIA, N. Y., March 17—The Batavia Rubber Co. has declared the regular quarterly dividend of 1 per cent. on the common stock and an extra dividend of 1-4 of 1 per cent., also the regular quarterly dividend of 1.5 per cent. on the preferred. The dividends are payable April 1.

FRANKFORT, IND., March 13—Creditors of the Nyberg Auto. Co., involuntary bankrupt, have been notified by the referee, H. C. Sheridan, that a creditors' meeting will be held at 10 a. m., March 23, to hear protests against a plan to pay one 5 per cent. dividend and delay further payments.

Market Reports for the Week

This week's market reports saw few changes. Tin was stronger and higher both here and in Europe. The demand from consumers, however, continued light, interest thus far being largely speculative. Tin closed at \$38.20 at a gain of \$0.20 per 100 pounds. Fine Up-River Para rose 2 points. The rubber market here lacked new features of any consequence. Electrolytic copper rose \$0.00 1-8 per pound while the Lake dropped \$0.00 1-10.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05 3/4	.05 3/4	.05 3/4	.05 3/4	.05 3/4	.05 3/4	
Beams & Channels, 100 lbs.	1.36	1.36	1.36	1.35	1.36	1.36	
Bessemer Steel, ton	21.00	21.00	21.00	21.00	21.00	21.00	
Copper, Elec., lb.	.14 1/2	.14 1/2	.14 1/20	.14 1/20	.14 1/2	.14 1/2	+ .00 1/2
Copper, Lake, lb.	.14 1/2	.14 1/2	.14 1/2	.14 1/2	.14 1/10	.143/20	— .00 1/10
Cottonseed Oil, bbl.	7.24	7.22	7.23	7.26	7.20	7.34	+ .10
Cyanide							
Potash, lb.	.17	.17	.17	.17	.17	.17	
Fish Oil, Menhaden, Brown	.40	.40	.40	.40	.40	.40	
Gasoline, Auto.							
bbl.	.16	.16	.16	.16	.16	.16	
Lard Oil, prime	.93	.93	.93	.93	.93	.93	
Lead, 100 lbs.	4.00	4.00	4.00	4.00	4.00	4.00	
Linseed Oil	.53	.53	.53	.53	.53	.54	+ .01
Open-Hearth Steel, ton	21.00	21.00	21.00	21.00	21.00	21.00	
Petroleum, bbl., Kans., crude	1.05	1.05	1.05	1.05	1.05	1.05	
Petroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	2.50	
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	
Rubber, Fine Up-River Para	.73	.73	.73	.74	.75	.75	+ .20
Silk, raw Ital.	5.25	5.25	5.25	5.25	5.15	5.15	— .10
Silk, raw Japan	4.35	4.35	4.35	4.35	4.35	4.35	
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	
Tin, 100 lb.	38.00	37.70	37.63	37.63	38.00	38.20	+ .20
Tirc Scrap	.04 1/2	.04 1/2	.04 1/2	.04 1/2	.04 1/2	.04 1/2	

Crown Company Buys Ohio's Louisville Plant

Deliveries Are Planned to Start April 15 on Output of 10,000 Cars Before September 1

LOUISVILLE, KY., March 14—The Crown Motor Car Co., which several months ago contemplated moving to Hamilton, O., has changed its plans, and this afternoon purchased from Ferdinand Kahler the big automobile factory on Vincennes street, New Albany, Ind., formerly occupied by the Ohio Falls Motor Car Co. The price paid was \$50,000, it was announced. The plant, which has been idle for about 3 months, includes six buildings, two and three stories in height. It is situated on a 6-acre tract of land.

A representative of the company stated today that the concern would employ 600 men and 10,000 machines would be manufactured between now and September 1. Deliveries will start April 15. While the factory is already equipped to build motor cars, additional automatic machinery of the most approved type will be installed. The plant has a capacity of 150,000 cars a year. Four hundred dealers have been secured on a co-operative plan.

The removal of the equipment of the factory at 121 North Third street in Louisville where the concern has been located for the past year, will be made the first part of next week. The concern has a capital stock of \$500,000. Officers of the Crown Motor Car Co. are: B. F. Lambert, head of the Buckeye Manufacturing Co., Elkhart, Ind., and the Ellwood Iron Works, Ellwood, Ind., president; A. B. Lambert, vice-president and C. H. Lambert, secretary and treasurer. The Crown is made in three models: The Crown Pilgrim roadster, \$395; the Crown Pilgrim touring car, four-passenger, \$475; The Crown Pilgrim 800 pound delivery car, \$450.

Porter Leaves Mercer To Build Car

NEW YORK CITY, March 18.—Finley R. Porter, who has recently resigned as chief engineer and factory manager of the Mercer Company, with which concern he has been associated for 4 years, announced today that he expects to have a factory of his own with an annual capacity of approximately 4,000 cars. This will be divided among two models of 300-inch size, which will list at approximately \$2,800, and of which 1,000 will be built, and a small car of 231 cubic inches, to sell at approximately \$1,500, and manufactured in quantities of 3,000 annually. Both of these will be four-cylinder types.

For the present Mr. Porter has opened temporary offices at 1790 Broadway, New York City, until complete arrangements for factory location and organization are made.

Four years ago Mr. Porter went with the Mercer Company as chief engineer, and one year later became factory manager in addition. During his connection with the Mercer Company he was responsible for many of their racing cars which were brought to a conclusion by the Grand Prize race in Santa Monica 2 weeks ago. He developed their race-about in 1910, which that year and the following established many 300-inch records and finished in the 500-mile race. In 1912 he brought out the Series F, which was third in the 500-mile race last year, and in 1913 he brought out the present 450-cubic inch type, one of which won the Grand Prize race.

Dodges Attack Income Tax Law

WASHINGTON, D. C., March 17—Special Telegram—Suits attacking the constitutionality of certain provisions of the income tax law were filed in the district supreme court here today by John F. and Horace E. Dodge, of Detroit, automobile manufacturers. They contend that the law unduly discriminates against individuals and partnerships in favor of corporations in the laying of surtaxes and in permitting corporations to withhold from taxation such portions of income as may be necessary for the needs and purposes of their business. The latter privilege is not allowed to individuals, their bill says. While the Dodge brothers appear as the plaintiffs, it is generally understood here that their case is a test suit in which all the automobile industry is concerned.

Hupp Executive Returns from World Tour

Second Globe-Girdling by Joseph R. Drake Impresses Him with Big Trade Chances in Australasia

DETROIT, March 14—Joseph R. Drake, vice-president of the Hupp Motor Car Co., has just returned from a 17 months' tour of the world, principally in the interests of the export business in Hupmobiles. This is the second tour of the kind which Mr. Drake has made, and he is perhaps as experienced in the ways of the Orientals and peoples of the Antipodes as any. Much of his traveling was naturally done in cars of the Hupp make, and some of his experiences in far-off lands with the motor car are of story-book interest.

Mr. Drake left this country from New York a year ago last fall in time to be present at the Olympia show of 1912 in London and again set foot on United States soil on February 3, returning to the factory here on March 9. His travels took him through parts of France and Italy, and from Naples he went to Ceylon, then later to Bombay, India. Mr. Drake's journeys in India totaled about 5,000 miles, mostly over the roads, which he describes as being some of the finest in the world. The Malay states, Australia, the Philippines, China, Japan, New Guinea, Tasmania, New Zealand, and Hawaiian Islands were visited by the American. His car was the first to enter German New Guinea, and naturally the natives were much excited over the steamer belong bush, as they called it.

Speaking of trade conditions, Mr. Drake states that, due to the growing popularity of the American car in Australasia, it is getting to be a lucrative field.

May Reorganize Walpole Tire Co.

BOSTON, Mass., March 13.—Circulars have gone out to the stockholders of the Walpole Tire & Rubber Co., setting forth the details of a proposed plan of reorganization. The plan provides for the formation of a new company with an authorized capital of \$3,500,000, of which \$2,000,000 shall be 7 per cent. preferred and \$1,000,000 common stock, to take over the assets of the present company. Holders of the preferred stock of the old company will get one share of new preferred for each share of their holdings plus \$75, and holders of common will get one share of new common for each share of their holdings, plus \$12.50. This will provide \$640,750 to be applied to the reduction of liabilities. The liabilities are approximately \$1,100,000, and after deducting the \$640,750, leaves \$459,250 to be otherwise provided for.

Judge Dodge has authorized the receivers of the company to set aside \$60,000 for payment of a 4 per cent. dividend to creditors whose claims already have been allowed. About \$700,000 claims will benefit by the first dividend. The balance is to be set aside for payment of a dividend on claims yet to be allowed.

The auditor employed by the receivers estimates net earnings for 1914 will be \$300,000 to \$350,000. With these earnings the new company can earn and pay off its indebtedness and pay its preferred dividends.

A decree has been filed in the U. S. Court, District of Massachusetts, by which an order for sale of assets of the company for liquidation was to be made March 14. This decree will be continued to March 31.

Garford Mfg. Co. Replaces Dean Electric

ELYRIA, O., March 14.—The sale of all property, assets, patents and good will of the Dean Electric Co. has been made to A. L. Garford, of Elyria. He has organized the Garford Mfg. Co. with a capital stock of \$500,000 preferred stock and \$800,000 common stock, to which these assets have been transferred.

The proposition submitted by Mr. Garford provided for the exchange of preferred stock of the Garford Mfg. Co. for bonds of the Dean Electric Co. which were outstanding, amounting in total to \$250,000; all creditors' claims, totaling \$427,000, to be put in the form of notes and are assured by the Garford Mfg. Co. and will be liquidated over a period of 5 years.

Mr. Garford becomes president of the new company and A. G. Bean, vice-president and general manager.

The company will be supported by the following board of directors: A. L. Garford, president, Automatic Machine Co., Cleveland, O.; John Sherwin, president, First National Bank and First Trust & Savings Co., Cleveland, O.; H. H. Johnson, M. B. & H. H. Johnson, attorneys, Cleveland, O.; A. G. Bean, vice-president and general manager; A. L. Patrick, certified public accountant, Cleveland, O.; John P. Brophy, vice-president and general manager, Cleveland Auto. Machine Co., Cleveland, O., and E. F. Allen, president American Lace Co., Elyria, O.

The company will continue the manufacturing of telephones, switchboards and electrical apparatus, and it will largely increase the automobile accessories department. This includes electric horns, speedometers, lighting generators and starters.

Singer to Make 90 Horsepower Six

NEW YORK CITY, March 18.—Chas. A. Singer, former president of the Palmer & Singer Motor Car Co. is one of the chief incorporators of the Singer Motor Co. of this city which has just taken up the manufacture of a new six-cylinder car.

The new car will have a T-head, 4 by 5.5 inch motor which the makers state will develop 91.8 horsepower at 1,900 revolutions per minute. It will be fitted with the C. R. G. carburetor and will have a Westinghouse single-wire lighting and starting system. Ordinary poppet valves are used. A four-speed gearset, V-radiator, left drive and streamline body will be among the features and the price including full equipment will be below \$2,500.

The company, which has been incorporated at \$200,000 under the laws of New York, will have its factory in Long Island City. The service station of the plant will be used as a temporary factory until building operations on the Long Island City plant have been completed. A. N. Dean has been engaged as chief engineer.

S. A. E. to Talk on Motor Design

NEW YORK CITY, March 18.—The Metropolitan Section of the S. A. E. which will hold its monthly meeting on the evening of March 26, at the Automobile Club of America, has chosen as a subject of discussion, The General Trend of American Motor Design. W. M. Power has been chosen to lead the discussion with a paper on this subject.

At the meeting of the springs division yesterday, the subject of cantilever springs was discussed and it is expected that considerable progress will be reported at the summer meeting.

Tire Company Tests Wheels for Economy

NEW YORK CITY, March 18.—In order to secure positive evidence on the value of the wire wheel as a tire saver, the Pennsylvania Rubber Co. has secured two Lozier fours, one of which will be equipped with wire wheels and the other with wood. The two cars will be equipped with a full set of vacuum cup tires and will be driven about the country, one behind the other until the tires blow out.

It is estimated that the car weight will be 4,300 pounds. The tires used will be 37 by 5 Q.D.s. and the wire wheels will be of the Rudge type as supplied by the Standard Roller Bearing Co. The test is run under the auspices of the A. C. A., the entire expense being taken by the Pennsylvania company. The tires have been purchased by the A. C. A. from the stock of scattered stores.

Cutler-Hammer Gets Vulcan Gearshift

MILWAUKEE, WIS., March 11.—Announcement is made that the Vulcan electric gearshift heretofore made and sold by the Vulcan Motor Devices Co., of Philadelphia, will hereafter be manufactured and marketed by the Cutler-Hammer Mfg. Co., of Milwaukee, under the Vulcan patents.

Roger W. Griswold, president of the Vulcan Motor Devices Co., and W. A. McCarrell, chief engineer, will continue to be actively interested in the manufacture and sale of the Vulcan Gear Shift.

Correction on Chelsea Clock Statement

NEW YORK CITY, March 17.—In an advertisement of the Chelsea Clock Co., Boston, Mass., which appeared in THE AUTOMOBILE for March 12, the statement was made that, for use on cars without electric lighting, the company winds the magnetos in its electric clocks for use on 1.5 volts, say a Columbia dry cell No. 6 or equivalent. The word magnetos in this sentence should have been magnets.

Inventive Humanitarian —Westinghouse—Dies

Was Employing His Last Efforts
Toward the Development of Air
Springs for Automobiles and Trucks

EAST PITTSBURGH, PA., March 13—George Westinghouse, the famous inventor and engineer, died of heart disease at his New York City residence on Thursday, March 12. His health had been failing for some time and consequently his death, though a great shock to his thousands of friends and acquaintances all over the country, was nevertheless in a measure anticipated.

The funeral was held Saturday afternoon at 2 o'clock from the Fifth Avenue Presbyterian Church, New York City.

Father an Inventor

George Westinghouse was born at Central Bridge, Schoharie County, N. Y., on October 6, 1846. His parents were George and Emeline Vedder Westinghouse. The father's ancestors came from Germany and settled in Massachusetts and Vermont before the Revolution; the mother's were Dutch-English. Mr. Westinghouse's father was an inventor, who, in 1856, removed his family to Schenectady, N. Y., where he established the Schenectady Agricultural Works.

Before he was 15, Westinghouse invented and made a rotary engine, and passed at an early age the examination for the position of assistant engineer in the United States Navy. After military duty in 1863 and 1864 he accepted an

appointment as third assistant engineer, United States Navy.

In 1865 he invented a device for replacing railroad cars upon the track, which, being of cast steel, was manufactured by the Bessemer Steel Works, at Troy, N. Y.

The first air-brake patent was issued April 13, 1869, and the Westinghouse Air Brake Co. was formed on July 20, following.

In the meantime, Mr. Westinghouse invented the automatic feature of the brake which overcame the imperfections in the first form, and removed the danger from the parting of trains on steep grades. In 1886, he invented the quick-action brake, the improvement being made in what is known as the triple-valve. By this valve it became practicable to apply all brakes on the train of fifty freight cars in 2 seconds.

In 1886 the Westinghouse Electric Co. was formed for the manufacture of lamps and electric lighting apparatus, Mr. Westinghouse having become interested in the subject. The business rapidly developed and in 1889 and 1890 this company absorbed the United States Electric Co. and the Consolidated Electric Light Co. In 1891 all these properties were reorganized into the Westinghouse Electric & Manufacturing Co., which owns extensive works at East Pittsburgh, employing over 22,000 people.

Within the last few years he also occupied himself with the development of an air spring for automobiles and motor trucks which rapidly came into favor.

All N. Y. Vehicles Must Carry Lights

NEW YORK CITY, March 16—The bill introduced into the N. Y. State Legislature by Senator Wilson, providing that all vehicles upon a public highway shall be provided with lights, has become a law. One of the notable points of this law is that it provides that upon any street or highway, if the street lights are maintained at not more than 500 feet apart, the vehicle need not be provided with lights. A penalty of \$5 for each violation is provided.

Recent Developments in State Automobile Legislation

Proposed Vehicle Ordinance Held Illegal

NEW YORK CITY, March 17—Corporation Counsel Polk has rendered an opinion in which he pronounces as illegal an ordinance submitted to the Board of Aldermen by Borough President Marks of Manhattan, to raise a fund to keep street pavements in repair by taxing the size of vehicles using these pavements, based upon the width of the tires of the wheels.

The proposed ordinance provided that no vehicle was to be allowed to pass over the pavements of any street of the city without a license, and to regulate the width of the tires on the wheels. The license fee was to be based upon the wheel bearing capacity of each vehicle and ranged from \$1 to \$1,000.

New Jersey Fee Bill Withdrawn

TRENTON, N. J., March 17—A bill recently introduced in the New Jersey Legislature providing for the licensing of automobiles, according to weight as well as horsepower by Governor Fielder, has been withdrawn. The measure provided for the payment of a fee of 50 cents a horsepower for automobiles of 22 horsepower or less and weighing 2,000 pounds; 60 cents per horsepower for automobiles of 22 horsepower or less and weighing between 2,000 and 3,000 pounds; 70 cents per horsepower for automobiles of 22 horsepower and less than 36 and weighing 3,000 pounds or less; 80 cents per horsepower for automobiles of 22 horsepower and less than 36 and weighing over 3,000 pounds and \$1 per horsepower for automobiles of 36 horsepower or over.

Commercial cars would pay according to the foregoing schedule, excepting

those weighing over 4,000 pounds, which would pay \$2 besides the regular fee.

If this bill had been passed, it would have increased the revenue of the state by about \$500,000. Some other means of raising the money will be worked out, it is understood, at a conference to be held shortly.

Measure Requires State Motor Board

NEW YORK CITY, March 17—Senator A. J. Griffin has introduced a bill at Albany for the appointment by the Governor of a State traffic commission to regulate motor vehicles.

The State traffic commission is to consist of three members at an annual salary of \$5,000 each. First class cities are to name one traffic commissioner at \$5,000 and second and third class cities may do so when authorized by the commission, these commissioners to have charge of the traffic squads.

The bill provides for registration fees of motor vehicles at \$5 for those of 1,000 pounds or less, with \$5 additional for every additional 1,000 pounds. The license fee for chauffeurs is \$2.

Stringent Bill Regulating Drivers Killed

NEW YORK CITY, March 11—At the hearing in Albany today, a bill which proposed to license all drivers of automobiles, whether owners or hired chauffeurs, was killed. Had the bill passed and became a law it would have been necessary for every owner to take an examination, have his photograph taken and attached to his license card, and wear a badge prominently displayed on his coat or hat.

Favors New Statute to Replace N. Y. Law

NEW YORK CITY, March 17—Taxation of motor vehicles by local communities instead of by the state is recommended by the New York State motor vehicle legislation commission which made a report to the legislature on March 16. The commission was created to confer with similar commissions from the New England states and New Jersey, Pennsylvania, Maryland and Delaware, with a view to harmonizing the present motor vehicle laws, but recommends that the recent report of the conference be not approved and that bills submitted by the New York state commission, radically different, be enacted into law.

If the commission's recommendations were adopted, New York state would still have a motor vehicle law differing from the laws of other states. Owners of automobiles would pay a single registration fee of \$2 for each machine to the state, and the present exemption from taxation of the machines as personal property would be stricken out. Motorcycles would be charged at the rate of \$2 each.

Two bills carrying out the commission's recommendations were introduced by Senator L. H. White of Schenectady. One in effect repeals the Callan law and substitutes the proposed law of the commission, and the other prescribes rules of the road for all forms of traffic on the streets and roads.

In the automobile law bill the driving of a motor vehicle by an intoxicated person is prohibited, among other things, and there is a general provision that violation of the act is a misdemeanor punishable by a fine of up to \$500, or one year in prison or both.

Boston Dealers Happy—1,000 Cars Sold

Outside Dealers Clamor for Admission to the Association—Attendance at Show Will Run Over 245,000

BOSTON, March 14—Once more new figures have been made for the Boston motor show. And again it has been impressed upon motor makers who follow conditions closely that the Boston exhibition is the real selling show of the season. As a result no one hears any rumors of a discontinuance of the show among the dealers, but rather those not members of the Boston Automobile Dealers' Assn. are clamoring for admission. There are more applications on file now than ever before, and if the directors wish to enlarge their organization there will be little trouble in doing it. The rule that a man must have been in business continuously for an entire season or approximately a year, either as an agent or a manager of a branch, keeps out those who would like to jump in just before a show.

In the matter of attendance new figures were made. Just how large these were could not be determined tonight, for it will take a few days to complete the count, but it will exceed the 245,000 of 1913. When the show was half over on Wednesday night the figures for the same three days of a year ago were exceeded. One of the surprising things was that on Wednesday night, Society night, when the price was doubled, the attendance had run up above 45,000, a new figure. This was thought to be the record, but on Thursday there were more people present.

The dealers are all happy over the outcome. There were many cars sold, the greater number being small machines of course. A number of dealers from various New England cities and towns closed up orders with people that promised to see them at the show. And the Boston dealers did a good business. Bona fide actual sales should total for the week at least 1,000 machines.

Nearly Everyone Made Sales

It was found by the correspondent of THE AUTOMOBILE that about everyone had sold something. The National agent advertised that eighty-nine sixes were sold by him and his agents. The Oakland had sixteen orders before Wednesday. The Hudson had 30 sales by Thursday night. One of the Ford men was authority for the statement that 102 sales were recorded at noon Friday. The Pathfinder sold six. The Chalmers orders exceeded a year ago, and the new Jeffery cars were also good sellers. In the big car class the average for the week was about two a day, which is very good considering the prices and the conditions of the money market. The dealers also got a lot of fine prospects and if they do not close up sales it will be for lack of real salesmanship.

Big Boom in Cyclecars

There was a big boom in the cyclecars. Boston had four-teen machines represented, a larger number than at any other show. These comprised the Duryea, Merz, Trumbull, Bantam, Salvador, Economy, Euclid, Laconia, Twombly, Mercury, LaVigne, Imp, Dudley and Cricket. Apparently New Englanders are going to go crazy over them judging by what was accomplished during the week. A few weeks ago there was one cyclecar representative here, the Imp, and now that the show is over every one of these fourteen have closed up agencies for Boston and vicinity. And the orders booked will keep the factories on the jump trying to fill them. Moreover, New England intends to make a bid for the building of these cars, for of the fourteen shown six are made in New England, and there are plans under way for more. These six comprise the Bantam and Salvador made in Boston; Economy at Providence; Trumbull at Bridgeport; Euclid at West Haven; and Laconia at Laconia, N. H.

The accessory men are delighted with their success. Many of them did not belong to the Accessory Manufacturers' Assn. and so in the past they could not get space, the association contracting for it and portioning it out as it pleased to its members. This year they could get desirable locations, as it was first come first served. One man that makes a

pump said he paid \$70 for his space and he had received orders representing more than \$900 worth of business.

BOSTON, March 17—The only big motor truck show held this season opened tonight in Boston at eight o'clock. There were thirty-seven exhibitors and a comprehensive line was displayed. It was possible to open this year a day earlier because permission was given to move out the passenger cars from the show on Sunday this year, something that the police commissioner would not allow in past years. As a result the cars were all out by Monday noon, many of them having been removed Saturday night after the show. The exhibition will close next Saturday night.

Long Interests Sue Klaxon Dealer

NEW YORK CITY, March 17—A patent infringement suit was filed today in Brooklyn, by the Long horn interests against the Martin-Evans Supply Co., Brooklyn agents for the hand Klaxon horn.

In the papers it is claimed on behalf of the G. Piel Co., makers of the Long horn, that the patents granted to it are basic with respect to a hand-operated horn, and that the Klaxon hand horn is an infringement.

It is further contended that the Klaxon company obtained knowledge that the applications for patents on the Long horn were pending, through an interference proceeding in the U. S. patent office, so that the infringement, it is claimed, is deliberate and willful.

It is further claimed that the Klaxon company allowed the G. Piel Co. to build up a substantial business in the Long horn without filing any suits or making any claim of infringement under the Klaxon patents, and that after the Piel company and the H. W. Johns-Manville Co. had demonstrated the success of the Long horn, the Klaxon company came out with the hand Klaxon.

It is believed that this case will come up for hearing at the same time as the case against another Brooklyn dealer in the Long horn which was started by the Klaxon people some 2 months ago, but has not yet been brought on for hearing.

NEW YORK CITY, March 17—Gasoline has dropped from 17 cents wholesale, where it was quoted in January, to 15 cents. The Standard Oil Co., the Texas Co., and the Gulf Refining Co., all reduced prices to 16 cents in the latter part of February, and within the last 2 days have made a further reduction of 1 cent a gallon.

England Has 245,907 Motor Vehicles

LONDON, ENGLAND, March 10—Lord Montagu, Editor of *The Car* states that the latest motor car census shows a total of 245,907 motor vehicles registered in the United Kingdom. Just 18,000 of these are trucks and the rest, 227,907, are pleasure cars.

Argo Motors To Be Built in Racine

NEW YORK CITY, March 16.—The Argo Motor Co., Inc., organized by Benjamin Briscoe to build a small automobile for \$295, has selected a plant in Racine, Wis., where it will build its motors and transmissions. This plant was formerly used by the G. W. Jagers Co., and has a capacity of about 125,000 square feet. About \$35,000 worth of special machinery will be installed. The company will manufacture about 10,000 motors this year, and expects to double this output for 1915. The radiators will be built at the Briscoe plant in Jackson, Mich. The cars will be assembled here in the West, near this city. The company has a few

factories in view, but has not as yet decided as to which one it will take. It is expected that the first model of the Argo company will be seen on the streets in the near future.

U. S. Rubber Will Not Place Loan

NEW YORK CITY, March 18—The United States Rubber Co. will not try to place a \$10,000,000 block of short term notes. This was stated at the annual meeting of the stockholders on March 17, at New Brunswick, N. J. The treasurer's report showed \$10,000,000 cash on hand, \$7,140,125.01 net profits, \$87,349,642.30 net sales, and cost of manufacturing, selling, taxes and general expenses, \$76,662,081.90.

N. Y. Taxi Merger Now Complete

NEW YORK CITY, March 16—The Mason-Seamon Transportation Co. has been organized following the consolidation of the Mason-Seamon Transportation Co., and the Yellow Taxicab Co., operating in this city. The capital is \$10,000,000, half common and half preferred stock. Of the preferred \$4,166,000 is to be issued. The directors are W. B. Harding, J. M. Shaw, P. F. Althur, C. H. Stevens, W. H. Boyce, J. H. Hodson, Jr., Jos. Alexander, Jas. O. Tyron, C. A. Rood and L. H. Bell. W. H. Barnard is president and treasurer, and E. B. Seaman, Jr., and Allen Lexow are vice-presidents of the company.

The Yellow Taxicab Co. will continue the operation of its cabs as a separate division. It will do the private business it has carried on since the passage of the new taxicab ordinance.

Patterson Enters Mercedes Six for Indianapolis

NEW YORK CITY, March 18—E. C. Patterson, gentleman sportsman of New York and Chicago, has today completed arrangements for the entry of a Grand Prix Mercedes six-cylinder car in the Indianapolis race on Decoration Day and the Elgin road races the last week in August. The car Mr. Patterson has obtained is a Mercedes six built specially for the Grand Prix race at LeMans, France, where his car competed last fall. The car on that occasion was driven by Salzer who finished fourth, averaging 73.3 miles per hour for the 335.5 mile race. The motor has cylinders 4 by 5.5 inches, cast in pairs, this giving a piston displacement of 415 cubic inches, and coming well under the limit of 450. The car is chain driven, has the steering pillar on the right side and is fitted with a stream-line body resembling the Mercedes-Knight entered by Patterson last year in the Indianapolis race and which made one of the most spectacular performances of the classic.

At present Mr. Patterson has not decided upon a driver but has Ralph DePalma and others in mind.

Dunlop 1913 Earnings, \$306,388

TORONTO, ONT., March 16—Earnings of \$306,388 are shown in the annual report of the Dunlop Tire and Rubber Goods Co., for the year 1913. This is an increase over 1912 of \$47,486. After paying bond interest, preferred dividends, and other charges, the surplus available for the common stock was \$176,831, or equal to 25.26 per cent., as against 20.34 per cent. in 1912. After the payment of \$70,000 dividends on the common shares, \$106,831 was added to surplus, bringing the latter up to \$624,194.

Boston Has Cyclecar Club—Other Activities

BOSTON, March 14.—The Cyclecar Club of New England was launched here during the week by representatives of the 14 machines that were displayed at the show. There were 21 representatives present and much enthusiasm was manifested. It was decided to have not alone a permanent organization, but also a clubhouse. Secretary F. Ed. Spooner and Vice-President R. F. Kelsey of the National Cyclecar Club of America made addresses. E. P. Blake, Imp Cyclecar, president; H. Ross Maddocks, Twombly, first vice-president; C. J. Fischer, La Vigne, second vice-president; C. S. Roberts, secretary; A. E. Kenny, treasurer; F. J. Tyler, J. S. Richards, F. S. Corlew, A. C. Gosse, Joseph E. Green, directors. Rooms will be secured at the Hotel Oxford.

It is planned now to have a series of cyclecar shows throughout New England. Arrangements are being made for one in Worcester, another in Springfield, and a third in Providence. Plans will be mapped out so that the cars will tour from one city to another, have a show during the day and evening and then move on like a circus visiting the principal cities in all the New England states. Committees will also be appointed to conduct runs and tours during the Summer so that the interest in the product will be kept up.

New Ohio Cyclecar on Road

COLUMBUS, O., March 13.—H. S. Paine of the Westerville Garage, Westerville, Ohio, has built a cyclecar which is being

shown in Columbus. The car has a wheel base of 100 inches and a tread of 44 inches. It is driven by a four-cylinder motor 2½ by 3¼ inches. The transmission is of the friction type with a double disk.

Gage Cyclecar To Be Los Angeles Product

LOS ANGELES, CAL., March 14.—The Gage Manufacturing Co., of Los Angeles, Cal., was recently incorporated for \$20,000 to build cyclecars. The concern already has contracted to build 4500 cars to be distributed on the Pacific Coast. They will manufacture a two-cylinder, air-cooled, two-passenger car called the Gage Cyclecar.

Santa Monica Wants Races

After Much Bickering by the Town Executive, Western A. A. May Endeavor to Move Course

CHICAGO, ILL., March 14—War threatens between the Western Automobile Assn. and the city of Santa Monica and it may be there will be a division of interests which will result in Chairman Shettler and his colleagues picking out some other course over which to run their road racing classics. Indeed, matters have gone so far that Mr. Shettler declares he is going to open negotiations with several owners of big tracts of land in the vicinity of Los Angeles in an effort to find a location where an 8-mile course can be laid out on private property. If this is found and the deal goes through Santa Monica and the Western Automobile Assn. will part company.

All this trouble has come about since the running of the Vanderbilt and Grand Prix, so advices from Los Angeles inform. It seems that Mayor Dudley of Santa Monica has come out in interviews and declared that Santa Monica is big enough to handle the classics without the help of the Los Angeles contingent and urges the formation of a Santa Monica association for the purpose of handling future road races like the Vanderbilt.

Inasmuch as the Western Automobile Assn. is credited with having the inside track with the Motor Cups Holding Co., it is figured that Santa Monica would have hard sledding without the W. A. A.

No Fairmount Park Race for 1914

PHILADELPHIA, PA., March 13—Disregarding a resolution unanimously passed by Select and Common Councils requesting that the race be held, together with an indorsement of Councils' action by the Market Street Merchants Association, the Fairmount Park Commission at its regular monthly meeting held on Wednesday afternoon refused the request of the Quaker City Motor Club for permission to resume the 200-mile race on the course in Fairmount Park.

Minerva-Knight Won Swedish Trials

NEW YORK CITY, March 13.—A correction of a misapprehension as to the winner of the 1914 Swedish winter reliability trials comes from F. E. Lonas, secretary, Knight & Kilbourne Patents Co., Chicago, who writes THE AUTOMOBILE:

"The 18-horsepower Minerva-Knight car driven by Osterman was the winner, he having finished without the loss of a single point. He was the only one to finish with a perfect score, and the next nearest competitor was penalized 33 points. This trial was conducted under the most appalling conditions of any reliability trial that has probably ever been held. It was described in the English Motor of February 17 as 'The most strenuous test ever held.' Out of sixty-one competitors only twelve were able to finish at all, and most of these with heavy penalizations, the marks lost in some cases being over 5000.

"This is the third time that the Minerva-Knight has won the Winter Cup in these Swedish Winter Reliability Trials."

Factory Miscellany

FORD'S New Record—More than 1,000 completed automobiles a day for 24 consecutive working days was the new record hung up during February by the Ford Motor Co., Detroit, Mich. February shattered all previous production records of the company. During this single short month 24,621 Model Ts were built and shipped. This excelled the month of January, itself a record smasher, during which 23,936 Model Ts were built and shipped to branches and agents throughout the world. Prior to January, 1914, the company's big month came in June, 1913, when 22,049 Model Ts passed out through the factory's doors. But not only did the company in February break all records of previous months, but it also set a new high-water mark for a day's production of automobiles, when on the 27th of the month it turned out 1,636 complete Fords. The previous daily production for automobiles, also a Ford record, was made one day last Spring when the big factory at Highland Park, Mich., built more than 1,300 cars.

Hydraulic Truck Will Build—The Hydraulic Truck Co., Colton, Cal., has let contracts for a factory building.

Johnstown Rubber May Build—The Johnstown Rubber Co., Johnstown, Pa., is considering the purchase of a site and the erection of a factory.

Catasauqua Plant Burned—The plant of the Catasauqua Motor Co., Catasauqua, Pa., was destroyed by fire recently with a loss of \$40,000.

Aluminum Castings' New Headquarters—The Aluminum Castings Co., Detroit and Cleveland, has decided to transfer its headquarters from Cleveland to Detroit.

Monroe Body Adds—The Monroe Body Co., Pontiac, Mich., manufacturer of automobile bodies, will build an addition to its plant. Plans have not as yet been published.

Will Replace Echo Plant—A new building to take the place of the burned plant of the Echo Motor Co., North Tonawanda, N. Y., will be under way in the near future.

Metropole May Locate in W. Va.—The Metropole Motor Corp., Port Jervis, N. Y., is reported to be negotiating for the location of its plant in Morgantown, W. Va. It asks for a guarantee of approximately \$125,000.

Western Tire Co. Builds—The Western Tire & Rubber Mfg. Co. will build a factory at Regina, Sask., to be 60 by 300 feet, of brick and reinforced concrete. The building and machinery will cost \$175,000.

Dayton Co. Will Build—Plant additions are announced by the Dayton Mfg. Co., Dayton, O., maker of the Dayton airless tire. The capital stock of the company is to be increased to \$1,000,000 at once and work commenced on the new factory buildings.

Besley Plant Nearly Completed—The new plant of C. H. Besley & Co., Beloit, Wis., is rapidly nearing completion. Operations will be started in the new works about April 1 and the production

The Automobile Calendar

March 17-21	Boston, Mass., Truck Show.
March 18-22	Sharon, Pa., Auto Show.
March 21-23	St. John, B. C., Show, Armory, New Brunswick Auto Assn.
March 24	New York City, Electric Veh. Assn. Meeting, Engineering Bldg.; T. S. Schoetz, Westinghouse Electric Co., speaker.
March 24	New York City, S. A. E. Broaches Division Meeting.
Mar. 30-April 4	Denver, Colo., Thirteenth Annual Auto Show in Auditorium.
March 31	New York City, S. A. E., Electric Vehicle Division Meeting.
April 7, 8, 9	New York City, S. A. E., Standards Committee Meeting.
April 9-15	Manchester, N. H., Automobile Show.
April 12-19	Prague, Austria, Eleventh Annual International Auto Exhibition, Royal Tiergarten.
April 21	New York City, S. A. E., Research Division Meeting.
May 5	New York City, S. A. E., Electrical Equipment Division Meeting.
May 12	New York City, S. A. E., Ball and Roller Bearings Division Meeting.
May 14	New York City, S. A. E., Motor Testing Division Meeting.
May 25-26	Palermo, Sicily, Targa Florio, 700-Mile Race.
May 30	Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
June 1	Palermo, Sicily, Coupé Florio, 279-Mile Race.
June 23-26	S. A. E. Summe. Meeting, Cape May, N. J., Cape May Hotel.
June 24-26	Chicago, Ill., Seventh Annual Meeting of Nat. Gas Engine Assn.
July 3-4	Tacoma, Wash., Road Races, Tacoma Carnival Assn.
July 4	Sioux City, Iowa, 300-Mile Race, Sioux City Auto Club and Speedway Assn.
July 4	Lyons, France, French Grand Prix.
July 13-14	Seattle, Wash., Track Races, Seattle Speedway Assn.
July 25-26	Belgium Grand Prix Road Races.
Aug. 28-29	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct. 1	Paris, France, Kerosene Motor Competition.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
November	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.

of polishing and grinding machinery will be more than doubled.

Will Manufacture Starting Device—Bert Allen, formerly manager of the Vale Garage at Beloit, Wis., has established a factory in that city for the manufacture of a device to facilitate starting cold engines. The appliance is designed to heat the intake manifold and uses six dry cells.

Universal Tire Purchases Building—The Universal Tire Co., Los Angeles,

Cal., has purchased the building of the Dryfus Winery, Anaheim, Cal., and will remodel the building for the manufacture of automobile tires. It is reported that the company will install new equipment to cost \$75,000. H. H. Holdaway is president.

Shafting Co.'s \$150,000 Plant—Preparations are being made by the Pennsylvania Shafting Co., of which Willard Parker, of Philadelphia, is the managing head, to embark in the manufacture of Wright taper roller bearings for automobiles and other vehicles. To begin with, it is intended to construct, adjoining the present works at Spring City, Pa., a new plant, which, with its equipment, will cost about \$150,000.

Gauge Factory in Racine—Wayne Coakley and Earl Young, Beloit, Wis., inventors of a new type of gasoline gauge, have organized Coakley, Young & Co., to engage in the manufacture of this and other specialties on a large scale. A factory has been established at 1027 Hackett street, Beloit, Wis., but later the company expects to build its own plant. The gauge is of the mercury float type.

Bids \$78,000 on Sandusky Plant—At Sandusky, O., on March 2, the plant of the Sandusky Auto Parts & Motor Truck Co., offered for sale under an order of the United States court in bankruptcy proceedings, was bid in by J. J. Dauch, president of the Hinde & Dauch Co., Sandusky, for \$78,000. The plant was appraised at \$126,500. Mr. Dauch expects to use the plant to manufacture tractors and automobile power plants if the sale is confirmed by the Federal court.

Pierce Co. Will Double Capacity—As the result of closing an order with the Continental Motors Co., Detroit, Mich., to supply that company with motor governors, the Pierce Speed Controller Co., Anderson, Ind., will double its capacity. At present the Pierce plant is capable of turning out 150 speed controllers a week. It will be necessary to produce 400 or more speed controllers to take care of the Continental business. It is the intention of the company to get into a larger and more substantial factory and to add considerable machinery. The plant employs nine men at present. The force will be increased to 25 employees within a short time.

Addition to Abbott Plant—The Abbott Motor Co., Detroit, Mich., has lately added three departments, and is now doing its own body trimming, top work and painting. These additional departments, in connection with the increased demand for Abbott cars, have made it necessary to add a large three-story brick addition to the present plant. The building is now under way and the foundation is being put in. It is a three-story brick, slow burning mill construction, and will be equipped with automatic sprinkler system and electric power elevators. At the recent annual meeting of the company Edward F. Gerber was elected president. M. J. Hammers, vice-president, and Ferris B. Bick, secretary and treasurer.

The Week in the Industry



Motor Men in New Roles

GREER Succeeds Cain—Howard Greer, Jr., succeeds J. W. Cain as chief engineer of the McCord Mfg. Co., Detroit, Mich. Mr. Cain has been connected with the McCord company from its inception, at first being its advertising manager, and a year ago heading the engineering end. He will enter the railway supply business in Texas.

Eccleston Retires from Oakland—J. B. Eccleston has retired as general sales manager of the Oakland M. C. Co., Pontiac, Mich.

Staley Miller Rubber Manager—E. W. Staley, who until recently was St. Louis (Mo.) manager for the Diamond Rubber Co., has been made manager for the Miller Rubber Co. in that territory.

Collard Made Manager—Charles E. Collard has been appointed New England manager of the Vulcan-Bessemer Co., Boston. He was formerly with the Goodyear Tire Co., in New York City.

Monson General Sales Agent—C. S. Monson has been appointed general sales agent for Union windshields, made by the Union Auto Specialties Co., Brookville, Pa., with headquarters at 1216 Dime Savings Bank Bldg., Detroit, Mich.

Smith on Month's Vacation—L. R. Smith, president and general manager of the A. O. Smith Co., Milwaukee, Wis., left on March 12 for a month's recreation trip to Florida and other southern points.

Moore Resigns From Maxwell—John A. Moore, traffic manager of the Maxwell Motor Co., has resigned to assume the same relations with the Ajax-Grieb Rubber Co. and the Briscoe Motor Co., with headquarters in New York.

Beedon with Standard Truck—B. N. Beedon, formerly with the Firestone Tire & Rubber Co. and later with the American Voiturette Co., Detroit, Mich., has taken a position as traveling representative of the Standard Motor Truck Co.

Limric with Kelly-Springfield Tire—H. B. Limric, who resigned as Manager of the New England branch of the B. F. Goodrich Co. last week, has accepted the position of manager of the branch of the Kelly-Springfield Tire Co., Boston, Mass.

DePalma Writing a Novel—Ralph DePalma, in collaboration with M. Worth Colwell, is writing a piece of fiction entitled "In Fourth Speed." The hero of the story is a California racing driver. The novel is to be issued in the near future.

Elias Zimmerman Passes Away—Elias Zimmerman, who for the past several years has lived in Auburn, Ind., and who was president of the Zimmerman Mfg. Co., maker of buggies and automobiles, died last week of old age. He was in his eighty-fifth year.

Bruenauer Opens Detroit Office—The Gurney Ball Bearing Co., Jamestown, N. Y., has opened an engineering department at its new office in the Dime

Bank Bldg., Detroit, Mich., Room 1935. Otto Bruenauer, the western sales manager, is in charge.

Ollwell Joins Chalmers—L. E. Ollwell, formerly with the J. Walter Thompson Co., and for the past year and a half advertising manager of the National Cash Register Co., has joined the Chalmers Motor Co. as assistant to General Manager Lee Counselman.

Berger Selling Muir Carbureter—F. H. Berger, formerly chief engineer of the Oakland Motor Car Co., Pontiac, Mich., has opened a sales office in the Dime Savings Bank Bldg., in Detroit, for the marketing of the product of the Muir Carburetor Co., Baltimore, Md.

Waller Lincoln Assistant Manager—T. B. Waller, formerly connected with the Lincoln Motor Sales Co., Seattle, Wash., has been named as assistant general manager of the Lincoln Motor Truck Co., Sacramento, Cal., where the Lincoln truck is being manufactured.

Blanchard Heads Cole Agency—G. A. Blanchard has been appointed vice-president and general manager of the Pacific M. C. Co., San Francisco, Cal., to fill the vacancy caused by the resignation of Colonel C. L. Hewes. This company is the agent for Cole cars in that territory.

Stahl Chicago Sales Manager—The Connecticut Telephone & Electric Co., Meriden, Conn., manufacturer of the Connecticut ignition products, has appointed C. E. Stahl Chicago sales manager. Charles Rubel recently resigned from this company to go into an accessory business of his own in Washington, D. C.

O'Brien Goes West—Frederick P. O'Brien, formerly with the J. W. Maguire Co., Pierce-Arrow agent in Boston, Mass., and later sales manager of the F. E. Wing Co., New England distributor of Marmon cars, resigned last week to go to Indianapolis, where he has taken the agency for the Pierce-Arrow car for the state of Indiana.

Cook and Smith Make Changes—E. B. Cook, Jr., has succeeded H. L. Smith as Indiana manager for the Kelly-Springfield Tire Co., with headquarters in Indianapolis. Mr. Smith has been advanced to the position of manager of the company's sales branch at St. Louis, Mo. Mr. Cook is a nephew of Otis R. Cook, sales manager of the company.

Souther Joins Ferro—Henry Souther has become vice-president of the Ferro Machine & Foundry Co., Cleveland, O., succeeding C. B. Wilson, who has retired. He has been identified for the last four years with the Standard Roller Bearing Co., Philadelphia, Pa. Before that he was the consulting engineer of the Association of Licensed Automobile Manufacturers.

Studebaker Men Organize—Dealers handling the Studebaker line in New England now have an organization to promote good fellowship and increase the popularity of that make of car in their territory. It is known as the New England Association of Studebaker Dealers and it was formed during the Boston

show with Joseph Donovan as president.

Strout Resigns from Haynes—The resignation of George H. Strout as general sales manager of the Haynes Automobile Co., Kokomo, Ind., has been announced and will become effective April 1. Mr. Strout had held the position one year, having resigned a position as district sales manager of the Cole Motor Car Co. Mr. Strout has not announced his future plans.

Knight with Boston Auto Gage—W. C. Knight, formerly manager of the Warner Instrument Co., in Cincinnati, O., and in Indianapolis, Ind., and for the past year with the Stewart-Warner Corp., Detroit, Mich., has been appointed Western sales manager for the Boston Auto Gage Co., Boston, Mass., manufacturer of gasoline and oil gauges. Mr. Knight has opened an office at 1231 Woodward avenue, Detroit.

Tylers Back in Business—Frank J. Tyler and his brother Lucius, both of whom headed the Maxwell Co., Boston, Mass., a few years ago when it was launched from the factory, and who made much money with it, but of late have been out of the motor field, have re-entered it to manufacture a cyclecar called the Bantam. It is being made in Boston at the factory of the Lenox Motor Car Co. Salesrooms have been opened for it on Boylston street.

White with Cadillac—D. McCall White, former works manager of the Crossley Motors, Ltd., Manchester, England, and late chief engineer of D. Napier & Son, Ltd., London, England, who is an exponent of the high-efficiency, high-speed motor, having been leading figure in England in the development of this type not only for touring car work, but also for racing cars, has taken a position with the Cadillac Motor Car Co., Detroit, Mich., in an engineering capacity.

Long Succeeds Danaher—D. H. Long, formerly Louisville (Ky.) manager of the U. S. Cast Iron Pipe & Foundry Co., has been chosen vice-president and general manager of the Southern Motors Co., succeeding G. S. Danaher, who formerly was connected with the Hudson M. C. Co., Detroit, Mich. A. L. McCormick, who organized the concern, also has resigned. Lee Miles will continue as president. The company handles the Packard, Hudson, Overland and Detroit electric.

Garage and Dealers' Field

Prowodnik Tires in Hartford—The E. J. Todd Rubber Co. has taken on the agency for Prowodnik tires in Hartford, Conn.

New "J-M" Service Station—The Milwaukee, Wis., branch of the H. W. Johns-Manville Co., has opened an automobile service station at 96 Second street, that city. This station is another link in the chain of forty-nine service stations in the principal cities throughout the United States and Canada.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent	Place	Car	Agent
Aberdeen, Wash.	Grant	Harry Kidd	New Orleans, La.	Kisselkar	Southern M. C. Co.
Adelaide, Australia	Republic	Eyes & Crowles	New Rochelle, N. Y.	Cole	G. O. Reynolds, Inc.
Albany, N. Y.	Cole	Adirondack M. C. Co.	Nevada, Ia.	Cole	J. F. MacDonald
Amarillo, Tex.	Cole	C. G. Maddox	Nordin, Neb.	Oakland	Langer & Frauen
Armington, Ill.	Cole	R. L. Kampf	Norfolk, Va.	Kisselkar	Kirkman M. C. Co.
Atlanta, Ga.	Republic	Mark Nabors Co.	Okmulgee, Okla.	Jeffery	Smith & Lambert
Bartlesville, Okla.	Jeffery	Auto Repair Co.	Oshkosh, Wis.	Cole	Cole Motor Co.
Beaumont, Tex.	Cadillac	J. F. Blackburn	Ottawa, Ont.	Chalmers	Victoria Garage
Beloit, Kans.	Baker	Beloit Auto Co.	Ottawa, Ont.	Hupmobile	Victoria Garage
Blair, Neb.	Jeffery	Jensen Bros.	Ottawa, Ont.	Page	Victoria Garage
Bloomfield, Ky.	Overland	J. W. Huston	Ottawa, Ont.	Studebaker	J. P. Gilpin
Bowling Green, Ky.	Overland	W. Y. McGinnis	Owensboro, Ky.	Overland	Central Motors Co.
Breeze, Ill.	Cole	Breeze Garage	Owenville, Mo.	Metz	J. H. Carmi
Britt, Ia.	Kisselkar	Castle Auto Co.	Paducah, Ky.	Moon	Lack Auto Co.
Brookfield, Mo.	Moon	Barbee & Carter	Park River, N. D.	Kisselkar	D. E. Kinsala
Buffalo, Ky.	Hupmobile	Orville Upton	Peekskill, N. Y.	Cole	Eagle Garage
Buffalo, N. Y.	Republic	L. G. Schoepflin Co.	Pensacola, Fla.	Cole	N. Goldring
Calera, Okla.	Jeffery	J. C. Kenton	Philadelphia, Pa.	Kisselkar	Gibbons-Wetherill Service Co.
Campti, La.	Jeffery	J. F. Smith	Philadelphia, Pa.	Paterson	Penn Auto Sales Co.
Canton, O.	Chandler	Canton M. C. Co.	Philadelphia, Pa.	Republic	Hub Garage Co.
Canyon, Tex.	Moon	Grundy & Guthrie	Piedmont, W. Va.	Cole	W. T. Sizler
Carmi, Ill.	Chevrolet	Leathers & Newcomb	Pittsburg, Kans.	Cole	Pittsburg Automobile Co.
Chillicothe, O.	Paige	Theodore Johnson	Port Washington, Wis.	Buick	Erlor & Aggen
Chippewa Falls, Wis.	Kisselkar	C. H. Danner	Poughkeepsie, N. Y.	Jeffery	Ryder Motor Co.
Cisne, Ill.	Empire	C. T. Maris	Princeton, Ill.	Moon	J. M. Ennes
Colorado Springs, Colo.	Moon	C. E. Wolf	Pueblo, Colo.	Moon	Western Motor & Truck Co.
Corydon, Ind.	Overland	V. H. Bulleit & Sons	Richland Center, Wis.	Detroit	Pier Auto Co.
Cleveland, O.	Republic	Bingham M. C. Co.	Richland Center, Wis.	Ford	Pier Auto Co.
Danville, Ill.	Cole	Wm. McFerron & Co.	Richland Center, Wis.	Mitchell	Pier Auto Co.
Dayton, O.	Moon	F. W. Blum Auto Co.	Ripley, O.	Oakland	C. O. Sneider
De Pere, Wis.	Ford	Tooney-Barlament Co.	Rochester, N. Y.	Republic	Flower City Oil & Grease Co.
Des Moines, Ia.	Moon	Means Automobile Co.	Russellville, Ky.	Overland	E. H. Cornelius
De Soto, Mo.	Empire	T. B. Maness	Ruston, La.	Jeffery	C. P. Cooper
Detroit, Mich.	Republic	Grasser Motor Co.	Salem, Ore.	Grant	W. S. Fitts
Dixon, Ky.	Hudson	R. L. Jackson	Salisbury, Md.	Republic	Peninsula M. C. Co.
Eaton, O.	Cole	S. J. Brower	San Francisco, Cal.	Republic	E. Stewart Automobile Co.
Eminence, Ky.	Hupmobile	D. L. Ricketts	Scottsbluff, Neb.	Cole	J. A. McDonald
Estherville, Ia.	Cole	Estherville Garage	Shelbyville, Ky.	Overland	Mammoth Garage
Everett, Wash.	Cole	Hilzinger Motor Co.	Somerset, Pa.	Jeffery	West End Garage
Fall Creek, Wis.	Maxwell	Stubbe & Stelter	St. Louis, Mo.	Grant	Compton Heights Garage
Fall Creek, Wis.	Overland	Stubbe & Stelter	Stithon, Ky.	Overland	J. F. Aubrey
Fenton, Mich.	Jeffery	E. F. Bullard	St. Joseph, Mo.	Cole	Grand Center Auto Co.
Flat River, Mo.	Empire	Flat River Motor Co.	St. Louis, Mo.	Herff-Brooks	Lindell Auto Sales Co.
Fon Du Lac, Wis.	Paterson	Barnes & Mabie Co.	St. Louis, Mo.	Howard	Robinson and Newell
Fort Wayne, Ind.	Kisselkar	H. G. Raymond	St. Louis, Mo.	Lexington	Robinson and Newell
Fostoria, O.	Reo	H. J. Adams	St. Louis, Mo.	Metz	DeLuxe Automobile Co.
Frankfort, Ky.	Hupmobile	Armstrong & Grey	St. Louis, Mo.	Herff-Brooks	Lindell Auto Sales Co.
Fremont, O.	Buick	Palace Garage	St. Paul, Minn.	Cole	Martin M. C. Co.
Fremont, O.	Overland	Palace Garage	Syracuse, Neb.	Oakland	J. H. Eaton
Gallion, O.	Buick	E. P. Rayl	Tacoma, Wash.	Buick	Progressive Motor Co.
Glasgow, Ky.	Hupmobile	Dr. Carl Richards	Tacoma, Wash.	Cole	Green M. C. Co.
Glasgow, Ky.	Overland	Dickinson Bros.	Tarrytown, N. Y.	Cole	Eagle Garage
Grand Forks, N. D.	Kisselkar	Sims Auto Co.	Tiffin, O.	Partin-Palmer	Wingart & Miller
Green Bay, Wis.	Kisselkar	West End Garage	Toledo, O.	Buick	Gauntlett Auto Sales Co.
Griswold, Ia.	Jeffery	Grinnell & Son	Toledo, O.	Hupmobile	Grasser Motor Co.
Greenwich, Conn.	Cole	Bullard Garage	Toledo, O.	Oakland	Baumgardner & Kibby
Hamburg, Ill.	Reo	A. F. Buchanan	Toledo, O.	Republic	Grasser Motor Co.
Harrisburg, Pa.	Cole	Bowman Co.	Toronto, Ont.	Grant	United Motors, Ltd.
Hartford, Conn.	Rayfield	Rettig Automobile Co.	Toronto, Ont.	Reo	Anderson Ltd.
Hastings-on-Hudson, N. Y.	Cole	Hastings Garage	Uehling, Neb.	Jeffery	Larson Bros.
Hillsboro, O.	Overland	Brent Woodmansee	Victoria, B. C.	Metz	Thomas Plimely
Honolulu, H. I.	Republic	Schuman Carriage Co.	Washington, O.	Paige	Moore & Jamison
Hopkinsville, Ky.	Overland	J. H. Skarry	White Plains, N. Y.	Maxwell	White Plains Garage Co.
Huntsville, Ala.	Moon	O. M. Graham	Winchester, Ky.	Hupmobile	Hagan & Walters
Imperial, Neb.	Oakland	J. N. Newman	Winona, Minn.	Cole	Nevine Livery & Transfer Co.
Irvington, Ky.	Overland	E. L. Bennett	Xenia, O.	Krit	McLain Auto Co.
Jeffersonville, Ind.	Overland	Jeffersonville M. C. Co.	Yonkers, N. Y.	Cole	H. D. Vanderlyn
Kalamazoo, Mich.	Republic	R. R. Brenner	Youngstown, O.	Moon	Regal Sales Co.
Kankakee, Ill.	Cole	N. H. Ohde			
Kansas City, Mo.	Hudson	Hudson-Brace Auto Co.			
Kendalville, Ind.	Moon	H. C. Waterhouse			
Kewanee, Ill.	Cole	Kewanee Garage			
La Crosse, Wis.	Cole	Elsen & Phillips			
Lawrence, Kans.	Baker	Lawrence Street Motor Co.			
Leesburg, O.	Overland	E. W. Pavey Auto Co.			
Lehigh, Pa.	Cole	Serfas M. C. Co.			
Lima, O.	Hudson	Baxter Bros.			
Lima, O.	Moon	H. L. Sherrick			
London, O.	Paige	J. M. Boecker			
Los Angeles, Cal.	Empire	Sparks Miller Motor Co.			
Lynchburg, O.	Overland	Kessler & Oldaker Auto Co.			
Madisonville, Ky.	Overland	W. J. Dulin			
Mansfield, La.	Jeffery	Persinger & Williams			
McArthur, O.	Detroit	Dr. A. W. Paffenbarger			
Melrose, Mass.	Lyons-Knight	F. H. Goss			
Memphis, Mo.	Jeffery	Fravel & Hudson			
Miami, Fla.	Kisselkar	A. H. Bouldin			
Millford, Ia.	Cole	Munson Bros.			
Millstadt, Ill.	Metz	August Diedrich			
Monett, Mo.	Cole	C. W. Lehnhard			
Monroe, La.	Jeffery	W. F. Cummings			
Montreal, Que.	Garford	Westmount Motors, Ltd.			
Morgantown, W. Va.	Cole	Colonial M. C. Co.			
Mt. Sterling, Ky.	Hupmobile	H. Clay McKee & Sons			
Mulkeytown, Mo.	Hupmobile	E. K. Elkins			
New Albany, Ind.	Hudson	Borgerding M. C. Co.			
New Albany, Ind.	Overland	Borgerding M. C. Co.			
New Castle, Pa.	Hudson	Baer & Ludwig			
New Castle, Pa.	Hupmobile	Baer & Ludwig			
New Castle, Pa.	Mitchell	Baer & Ludwig			

ELECTRIC VEHICLES

Abilene, Kans.	Baker	E. E. Coulson
Chanute, Kans.	Baker	Chanute Auto Co.
Joplin, Mo.	Baker	Kleinschmidt & Hemphill
Junction City, Kans.	Baker	Wenger & Brockman
Manhattan, Kans.	Baker	Whitlock Garage
McPherson, Kans.	Baker	Talbot & Gilson
Minneapolis, Kans.	Baker	Gage Auto Co.
Parsons, Kans.	Baker	C. E. Ervin
Springfield, Mo.	Baker	Jess & Sturdy
St. Joseph, Mo.	Baker	Selden Maxwell Co.
Victoria, B. C.	Waverly	Jameson & Rolfe

COMMERCIAL VEHICLES

Aberdeen, Wash.	Gramm-Bernstein	Harry Kidd
Ellensburg, Wash.	Gramm	E. L. Ferrier
Montreal, Que.	Federal	Stockwell M. C. Co.
Ottawa, Ont.	Indiana	W. D. Morris
Salem, Ore.	Gramm-Bernstein	W. S. Fitts
Tacoma, Wash.	Republic	Progressive Motor Co.

CYCLECARS

Boston, Mass.	Mercury	Victor M. C. Co.
Boston, Mass.	Lyons-Knight	Curtis-Hawkins Co.
Boston, Mass.	Merz	Stutz M. C. Co.
Boston, Mass.	Euclid	W. A. Bryant & Co.
Boston, Mass.	La Vigne	C. J. Fisher
Boston, Mass.	Economy	W. A. Magill
Boston, Mass.	Trumbull	Green & Co.
Boston, Mass.	Bantam	Tyler Bros.
Boston, Mass.	Laconia	F. H. Bufum
Columbus, O.	Scripps-Booth	Buckeye Cyclecar Co.
New York City	Lincoln	Capt. J. B. Dudley
Seattle, Wash.	Rocket	S. V. B. Miller
Tacoma, Wash.	Imp	Jesse Jones

Accessories for the Automobilist

THE Arnold Electric Vaporizer—This device, Fig. 1, is one of the latest acquisitions of the H. W. Johns-Manville Co., New York City. Briefly it consists of an electrical heater that warms the air before it enters the carburetor and thus facilitates starting in cold weather. The Arnold heater not only makes hand cranking less arduous but results in a saving in power when a compressed air or electric starter is employed. The vaporizer consists of a steel, asbestos-lined cylinder about 2.75 by 5 inches, in which are mounted a number of vitrified asbestos disks, coils of resistance wire running around the periphery of these disks. When the current is switched on these coils get very hot and the passage of the air by them raises it to a high temperature and then vaporization is accomplished without difficulty.

Another type of vaporizer, Fig. 2, is made for small cars such as the Ford. It consists of a coil of resistance wire that is inserted in the intake manifold. The coil is suspended between porcelain plugs through which connection to the battery is made. Its operation is similar to the larger type; the current is switched on preliminary to cranking and the heat generated in the wire warms the charge as it passes to the cylinders so that a combustible mixture is obtained.

Newtype Electric Searchlight—A handy light, Fig. 3, that can be instantly attached to any windshield, that can be turned in any direction, and will stay locked at whatever angle it is placed is made by the Wood Manufacturing Co., Fairfield, Conn. The advantage of such a light is that it provides illumination in every direction. It may be used when backing up, as well as for driving ahead and can be employed for illuminating



Fig. 3—Newtype electric searchlight with adjustable bracket for attachment to any windshield.

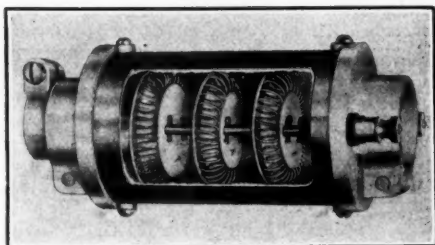


Fig. 1—Arnold electric vaporizer with section cut away to show the arrangement of the heating coils

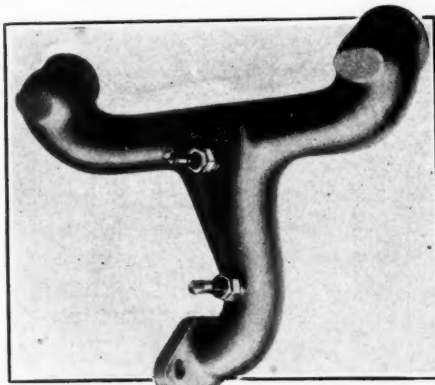


Fig. 2—Arnold electric vaporizer for small cars such as the Ford

signs, locating numbers on houses and lighting up sharp curves. It is of especial service to delivery truck drivers for looking up the names on their packages and then locating the house numbers.

A special lamp, which is lighted directly from the magneto, is designed for the Ford.

The switch used on the Newtype is integral with the handle and there is but one wire leading from the lamp. For this reason the installation is very simple and can be done by anyone. The price is \$7.00 and this includes an adjustable bracket, wiring and switch.

Spark-No Automobile Lock—Owing to the constant increase in the number of automobile thefts, car owners will be interested in the Spark-No automobile lock, Fig. 4, recently added to the line of the H. W. Johns-Manville Co., New York City. The Spark-No operates by breaking the ignition circuit, thus making it impossible to run the car, yet permitting it to be pushed so that it can be moved to and from the wash rack, or out of the garage in case of fire. The Spark-No resembles a clock and is designed for attachment to the dash, the wires running into it from the back. Its action is somewhat similar to a combination lock, the circuit being closed by turning the hands in a given sequence to

combinations of figures known only to the owner. Switching on the ignition while the lock is set results in the ringing of a loud bell that cannot be shut off until the combination is unlocked by the owner, and thus a warning is given that the car is being tampered with. The Spark-No is made in two models, flush-mounted and dash types, the former selling for \$12.50 and the latter \$10.00.

The Healy Valve Reseater—A tool that is designed to remove the drudgery incident to grinding in a valve with oil and emery has been put forth by the Healy Tool and Appliance Co., Brocton, N. Y. It is claimed that this tool, Fig. 5, will save 75 per cent. of the time that is required when a valve is ground in the old way and that it will do the work more accurately. This tool consists of two parts, one for finishing the valve and the other for resurfacing the seat. The valve is placed in the tool shown at the top of the figure and when it is rotated the edge comes in contact with the three cutters shown on the front of the tool and is thus given a smooth surface. These cutters are adjustable and when they become dull a new edge may be obtained by removing these cutters and grinding them on one side, thus the angle of the face of the cutters is not changed. These cutters are reversible and have a 45 degree edge on one end and a 60 degree edge on the other. By adjusting the cutters a roughing cut can be taken where the valve is in very bad condition.

The tool for reseating the valve is

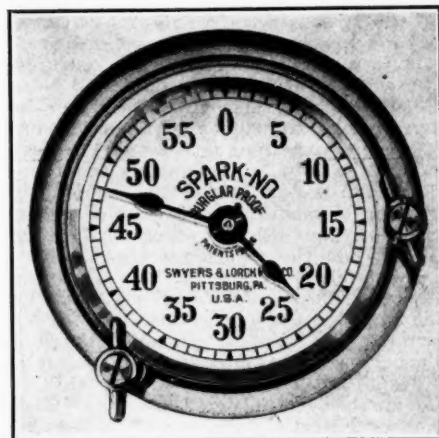


Fig. 4—Spark-No automatic lock



Fig. 5—Healy valve reseater. At the top is the tool for finishing the valve, while the valve seat cutter is shown below it

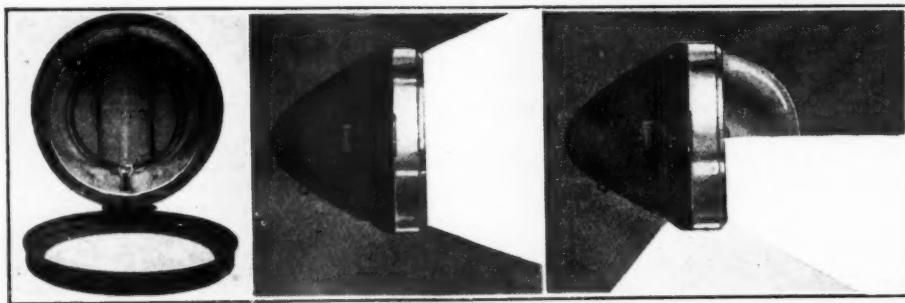


Fig. 6—At left—Ward-Leonard Nodaz lamp. Fig. 7—At right—Brown deflecting headlight

shown at the bottom and consists of a milling cutter that is carried on a spindle. One end of this spindle fits in the valve guide and the other end is carried in a ball bearing that screws into the valve opening in the cylinder casting. The tool is thus accurately centered and a perfect seat is the result. Various sized cutters are made so that seats of all sizes can be finished. These cutters are ground down slightly on opposite sides so that they may be easily slipped into the valve chamber. The price of this instrument complete is \$30.

Ward Leonard Nodaz Lamp—One of the most ingenious and notable of automobile accessories recently exhibited at the Automobile Show was the Nodaz lamp, Figs. 6 and 8, made by the Ward Leonard Electric Co., Bronxville, N. Y. This device satisfactorily meets the conflicting demands of the motor car drivers and city authorities in regard to headlights. It consists of two pairs of translucent wings mounted on pivots or bearings fastened in the headlight reflector. These wings are made to open and close by electro magnets situated inside the cover of the lamp itself. When running in the city where it is necessary to use reduced light in the headlights and avoid glare, the wings are closed simply by pressing a push button conveniently situated on the dash, or other part of the car. When the wings are closed, there is absolutely no glare, but the road near the car is flooded with strong, diffused light, a fact which makes the Nodaz particularly valuable when rounding sharp curves. At any moment when it is desired to use the full illumination of the lamp it is only necessary to push another button which opens the wings, and the concentrated searchlight beam is at once available.

When in the folded or open position, the wings do not perceptibly affect the light given off by the lamps, as they are very thin and are so placed that when folded do not perceptibly obstruct the rays of the headlights. The electro magnetic control is extremely convenient, and it takes only a small current from the battery just at the moment when the wings are either opening or closing.

A great advantage of the Nodaz device is that it may be attached to practically any headlight now in use at small cost, and requires absolutely no knowledge of electricity to assure its constant and satisfactory operation in service.

Ride-Over Spring Lubricators—To improve the riding qualities and remove the squeaks from the springs, the P. L. Avery Co., Milwaukee, Wis., has brought out a spring lubricator which consists of wafer-like strips of fabric impregnated and coated with flake graphite. These strips are long and thin and are to be

inserted between the spring leaves by spreading them. It is never necessary to take the springs apart in order to put in the wafers. It is said that these lubricators will furnish perfect lubrication and will last for months. They are sold at one dollar the box, there being sixty strips to a box.

Motokloth—The Earnsdale Worsted Co., Clinton, Mass., is making an upholstery material for automobiles that is said to possess all the good points and none of the bad features of leather. It is made from long fibre Australian wool

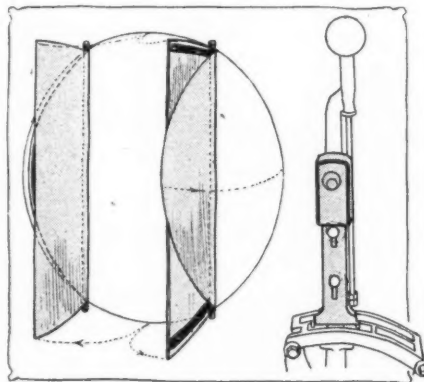


Fig. 8—At left—Diagram showing the operation of the translucent wings on the Nodaz headlight. Fig. 9—Benham automobile lock

and is strong, flexible, durable and waterproof. It holds its color, will upholster more easily and is much cooler in summer than leather, it is said. It is made in all colors to match the painting of the car and is just as suitable for reupholstering a car as for applying to a new machine.

Koeth's Interchangeable Tool—The Currier-Koeth Mfg. Co. Coudersport, Pa., is making a combination tool that is suited to do almost any kind of work. It has handles like a pliers and is made so that six different heads may be attached. The various tools that can be made include a gas pliers, tin snippers, tire chain tool, pincers, alligator wrench and leather punch. The great argument in favor of this interchangeable tool is that it saves the weight of several tools. The set is furnished either in a tool bag or chest, at the option of the buyer.

Brown Deflecting Headlight—A headlight, Fig. 7, has recently been put on the market by the Brown Co., Syracuse, N. Y., which is designed to comply with the regulations against using headlights in many cities. This headlight has an electrically controlled shutter that, in its lowered position, cuts off the light rays that ordinarily blind pedestrians.

This shutter is spherically shaped and when not in use folds back into the lamp so as to be entirely out of the way. When it is lowered it not only cuts off all rays above the horizontal, but it also reflects light back around the car so that the wheels are illuminated enough to make tire changes at night without any other light. The shutter is controlled by a small motor located in the back of the lamp and this motor is actuated by a switch. The outfit is applicable to present models as well as to future ones, inasmuch as it requires simply the attachment of the lighting current wire to a special connector furnished with the lamps.

Benham Automobile Lock—This lock, Fig. 9, is designed to go on to the gearshift lever, holding it in place so that it is impossible to shift the gears as long as the lock is set. It consists of a steel member that is slidably located on the gearshift lever and has its lower end so formed that the movement of the lever in the gate can not be accomplished as long as this member is in its lower position. The upper end of the member carries the lock. When the car is stopped the lock is set by simply pushing it down. Unlocking is done by means of a key that is specially shaped so that it is easily and quickly distinguishable from others on the ring. The lock is attached by drilling two holes in the gear lever and then riveting the two pins that hold the lock in place. The Benham lock does not interfere with the towing or the pushing of the car around the garage. The price is \$10.

Cleveland One-Man Top—A new one-man top, Fig. 10, has recently been placed on the market by the Cleveland Hardware Co., Cleveland, O., that is well constructed and very simple. The two forward bows are attached to the third bow from the front by suitable arms so that when the top is up the whole structure is securely locked in place. When the top is down these arms allow the bows to assume the same position that the bows on the two-man top have. The Cleveland top is fastened in place by strapping the front end to the windshield. There are no front bows to obstruct the ingress and egress of passengers.

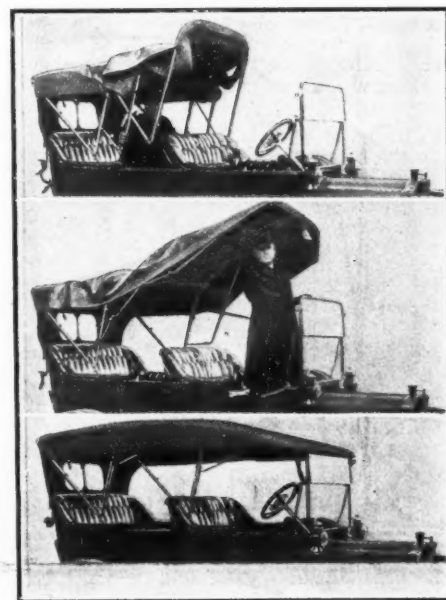


Fig. 10—Cleveland one-man top